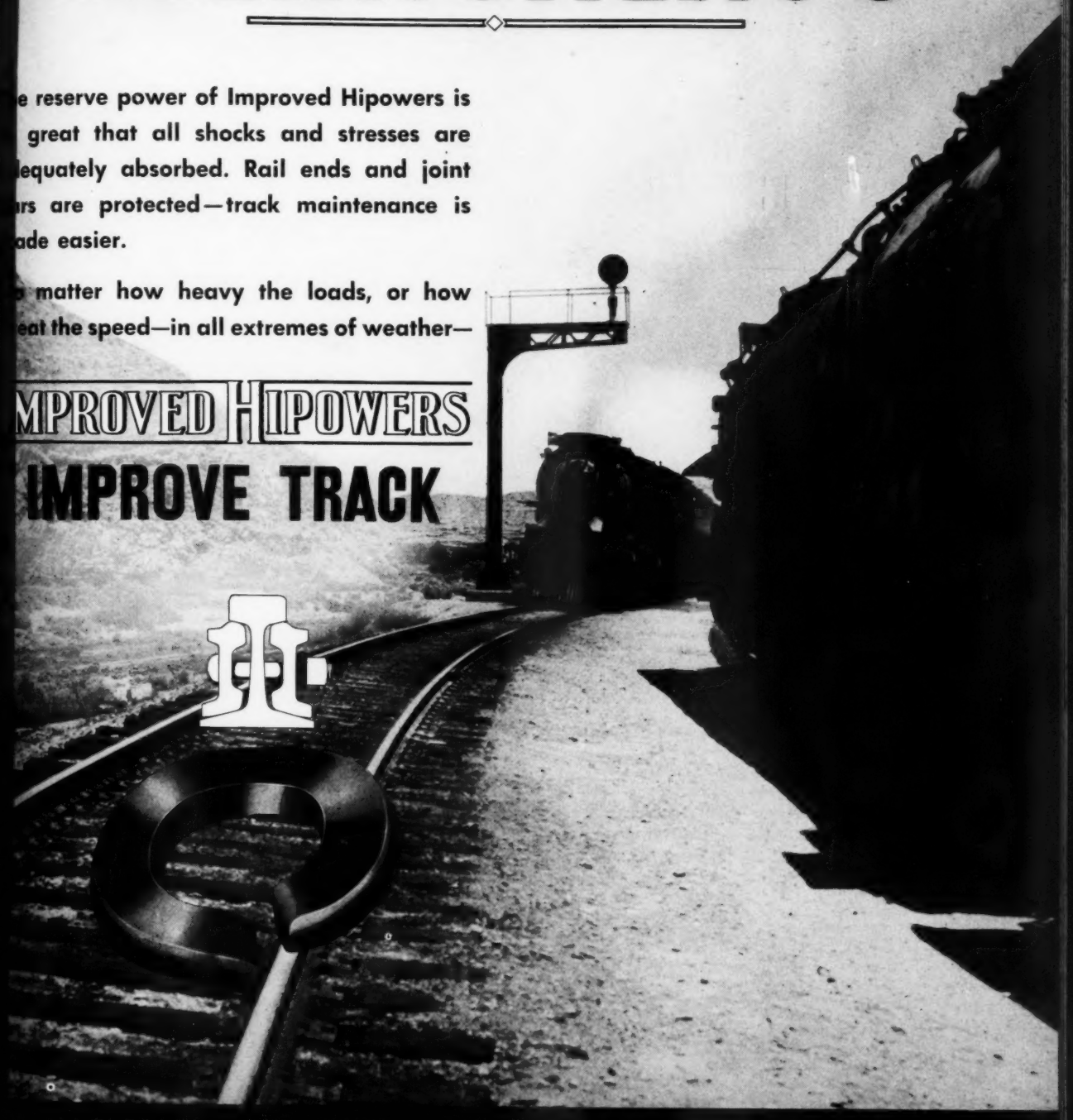
FEBRUARY, 1947

Railway Engineering and Maintenance



Meeting Higher Maintenance Standards

Without Higher Costs

• Heavier motive power, heavier axle loads and greater speeds demand higher track maintenance standards.

Reliance Hy-Pressure Hy-Crome Spring Washers help maintenance men meet this requirement of greater refinement of track by keeping rail joint bolts tight while holding down maintenance costs.

Made from special analysis alloy steel, cold drawn in Reliance's mill, they possess adequate non-fatiguing reactive pressure that automatically compensates for track-bolt looseness caused by stresses, strains, shocks, wear and temperature changes. They maintain correct bolt tension . . . keep track joints *tighter longer* . . . postpone rail-end conditioning and joint bar reforming or shimming.

On old rail, Reliance Hy-Pressure Hy-Crome Spring washers are the key to lower maintenance; on new rail,, they're a *must* for maximum track performance.

Adequate inventories and experienced personnel insure prompt, dependable deliveries of your requirements.

Edgemark of Quality

• *Write for the Reliance Railroad Track folder, showing complete Reliance Hy-Crome family of spring washers for track and track accessories.*

Reliance **HY-PRESSURE HY-CROME** *spring washers*

RELIANCE DIVISION
MASSILLON, OHIO

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montre

EATON
EATON MANUFACTURING COMPANY

THESE TWINS

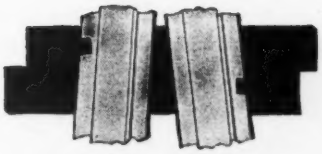
keep out of mischief!

Years ago, maybe you read our first advertisement about Twin-Hook Frog Plates—bouncing infants from whom we expected great things. As birthday followed birthday, they became so useful and popular that they've been adopted by railroad men the country over.

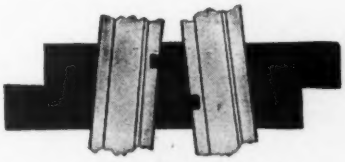
Bethlehem's Twin-Hook Frog Plates have advantages that you cannot get in conventional plates. They come in pairs, each plate being equipped with an integral, forged hook that fits snugly over the base of the frog.

This means, of course, that you don't need a special plate at each tie position. As you'll see from the pictures, one set of twins can be slipped into many different positions, regardless of the frog angle. A "low" hook fits railbound frogs; a "high" hook fits the cast type but can easily be hammered down for use with low-flange frogs.

If you haven't yet ordered Twin-Hook Frog Plates, get some and give them a thorough trial. They anchor frogs tightly and they help give you sturdier, longer-lasting track.



Standard plates are stocked in 23-, 27-, and 31-in. lengths.



Reverse-hook plates, for use at heel ends, are also available. Stocked in the 27-in. length.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

BETHLEHEM STEEL

BETHLEHEM TWIN-HOOK FROG PLATES

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 30, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams St., Chicago 3, Ill.

MIXING ASPHALT-CEMENT GROUT

FOR LOW COST, LASTING ROADBED STABILIZATION

YOU can stabilize "soft track" *better* by pressure grouting with a mixture of cement and *Texaco No. 24 Emulsified Asphalt.* "Better" means easier, faster application . . . lower initial cost . . . greater permanence . . . and substantial savings in track maintenance.

These benefits are proved by actual experience. One example (taken from the book shown at the right) is typical: After stabilization by pressure grouting, maintenance man-hours per mile per year were reduced from 2,932 to 926.

Texaco No. 24 Emulsified Asphalt was especially developed for grouting. It promotes easier flow of the mixture, assures more thorough penetration and better seal. In addition, it expedites the work, permits use of leaner, more economical mixtures, helps waterproof the soil and keep it resilient and stable.

Find out how *you* can reduce roadbed stabilization costs by asphalt-cement pressure grouting. Call the nearest Railway Sales Division Office listed below, or write The Texas Company, Railway Sales Division, 135 East 42nd Street, New York 17, N. Y.

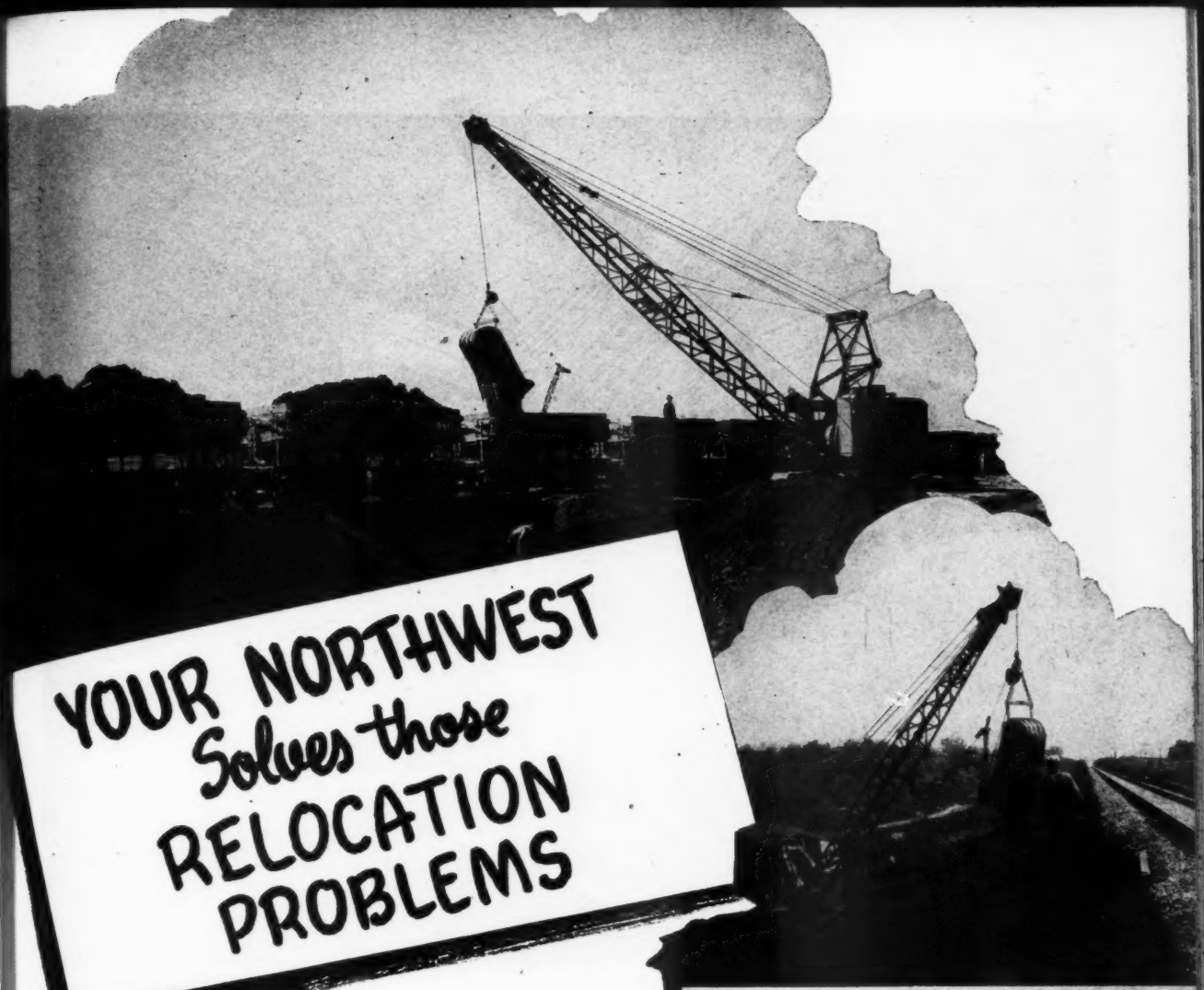
SEND FOR this fact-packed, 16-page, illustrated book. Describes the development of asphalt-cement pressure grouting, outlines a practical working set-up, shows costs and benefits secured by a leading railroad.

NEW YORK • CHICAGO • SAN FRANCISCO • ST. PAUL • ST. LOUIS • ATLANTA

TEXACO

TEXACO Emulsified Asphalt FOR GROUTING

Tune in . . . TEXACO STAR THEATRE presents the NEW EDDIE BRACKEN SHOW every Sunday night. Metropolitan Opera broadcasts every Saturday afternoon



YOUR NORTHWEST Solves those RELOCATION PROBLEMS

WIDENING right-of-way, curve reduction, relocation—those are problems of the day—a part of high-speed traffic. You need equipment that is versatile, fast, mobile.

Your Northwests will be the answer. As a Dragline a Northwest handles the excavation. It will spoil material well out of the way, build fill, or trim banks, build berm and widen shoulders.

As a Crane it handles rail, sets pipe, digs bell holes, lays culvert and unloads other equipment for the job.

Your Northwest goes anywhere. It loads and unloads under its own power on a standard flatcar, works from the car and travels from car to car. Travel gears are fully enclosed and run in oil. Tread shoes have alternate lugs, giving a self-cleaning action, and small crawler rollers prevent treads from wedging up when crossing rails.

Here is versatility, mobility and dependability that railway work requires. A Northwest does things you can't do with a track crane. Let us send you complete details.

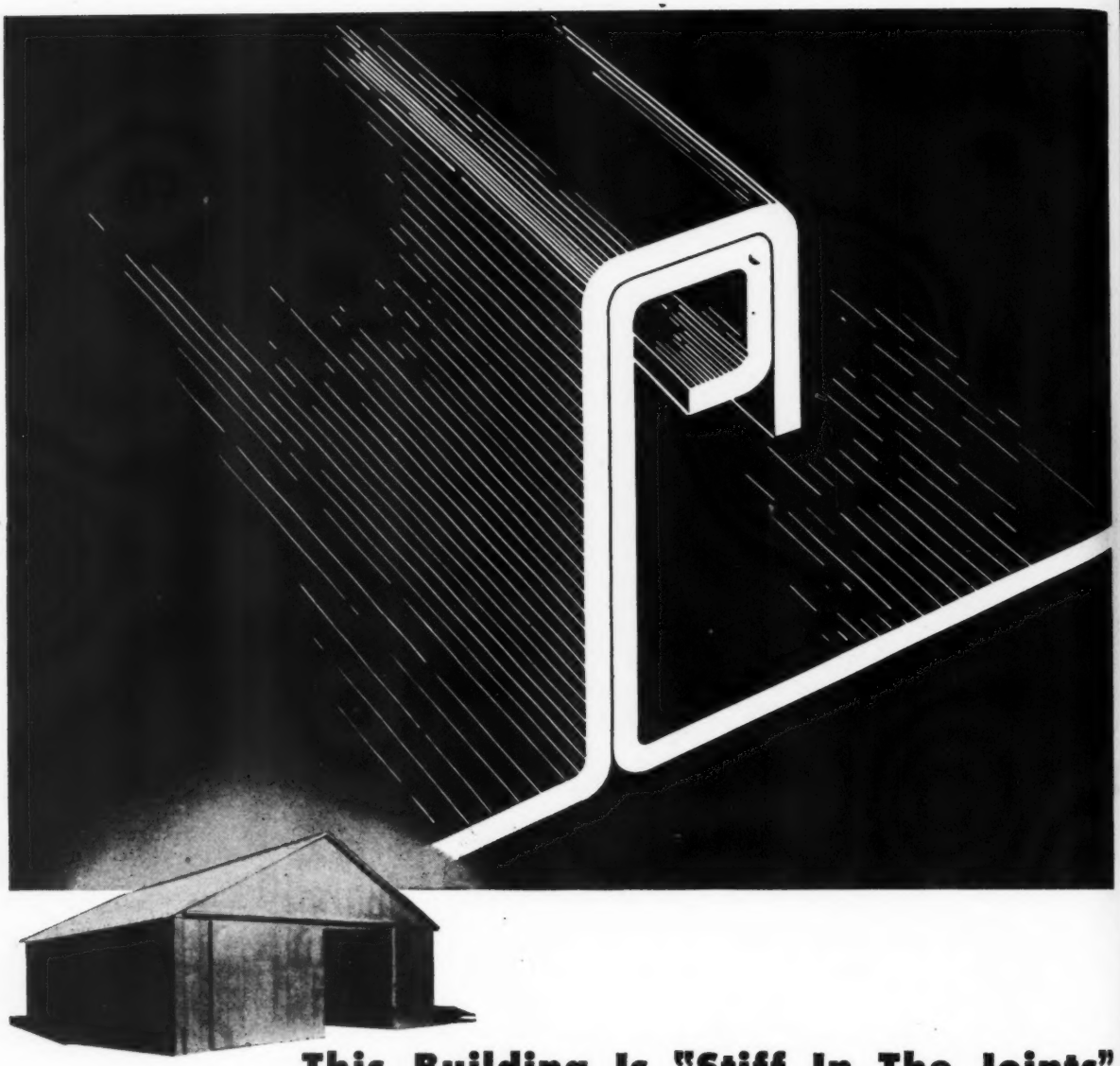
NORTHWEST ENGINEERING COMPANY
1713 Steger Building • 28 E. Jackson Boulevard • Chicago 4, Illinois

ALL-PURPOSE RAILROAD MACHINE

NORTHWEST

SHOVELS • • CRANES • • DRAGLINES • • PULLSHOVELS

Proved on the Nation's Leading Railways



This Building Is "Stiff In The Joints"

It is not a sign of old age because the Armco-developed STEELOX joint keeps these standard buildings trim and youthful.

With the revolutionary STEELOX method, the jointed panels provide both structural support and finished surface. For sidewalls they save framing and outside covering. On the roof, STEELOX panels replace rafters, sheathing and roofing. Assembly is simplified, appearance improved and weathertight construction assured. The patented joint withstands expansion, contraction and unequal settlement. It remains weathertight even under severe conditions. Unskilled workmen quickly join the panels into a sturdy, handsome structure.

There are other advantages in using Standard STEELOX Buildings. The sturdy panels are formed of ARMCO Galvanized PAINTGRIP Steel and can be painted immediately or left unpainted. No treatment is necessary. All-steel construction is an excellent fire-barrier. STEELOX Buildings have the long life and low upkeep of a permanent structure, yet when necessary can be quickly dismantled and re-erected at another location. All parts are uniformly strong yet light in weight for easy handling.

STEELOX Buildings are prefabricated in a wide range of standard sizes to fit your requirements. Write for prices and complete information. Armco Drainage & Metal Products, Inc., 845 Curtis Street, Middletown, Ohio. Offices in principal cities.

ARMCO STEELOX BUILDINGS

ARMCO

FOR *Better* MAINTENANCE-OF-WAY

The CP Patrol Compressor and CP Tie Tampers are an ideal combination for spot tamping and track repair work.

Being entirely air cooled — engine as well as compressor — the CP Patrol cannot freeze and is suitable for year-round operation. Having an actual capacity of 60 c.f.m. at 100 pounds pressure, it can operate four CP-3D Tie Tampers, or two CP-116 or CP-117 Spike Drivers, or any combination of tools of equal rating. The Compressor is easily transported and easily handled; front and rear retractable dollies facilitate tight-spot, single-rail handling "on track" and 4-point support "off track."

CP-3D Tie Tampers, notable for their easy handling and low air consumption, are efficient both for nipping and small rises, and also on jobs where the track is raised several inches.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Thousands of tests, under all kinds of service conditions, prove that "Dutch Boy" Red Lead gives metal extra protection

4 Ways RED LEAD RESISTS EFFECTS OF WATER ...guards against Rust

Maintenance engineers have long recognized Red Lead as the "standard" metal protective paint. This acceptance is based, to a great extent, on its marked ability to stand up against moisture, a powerful factor in the rusting process.

Now, scientific research into the inherent properties of the pigment itself, shows just how and why Red Lead resists the effects of water. Briefly, there are four reasons:

1. Red Lead resists water "pick-up"—If a series of various metal protective paint films are weighed and then submerged in water (salt or fresh), it is readily noticed, on reweighing after several days immersion, that Red Lead films have outstanding resistance to the absorption, or "pick-up," of water.

2. Red Lead resists passage of moisture—Rusting of metal will not take place if water does not penetrate the paint film to reach the metal. Water permeability tests of paint films (see illustration at lower left) show, beyond question, that Red Lead is one of the most effective metal protective pigments, because of its stubborn resistance to the passage of moisture through the film.

Testing Water Permeability of Paint Films—With this standard apparatus a measure of the amount of water that passes through a unit of film is obtained.

Experiments show that a straight linseed oil film allows three times as much water to pass through the film as when the same film is pigmented with Red Lead.

3. Red Lead resists solution by water—The action of water on paint films results in a partial dissolving of the film. Many metal protective films lose a considerable percentage by weight of their films through solution in water. On the other hand, the solubility losses of Red Lead paint films are practically negligible.

4. Red Lead resists distortion by water—Red Lead films have little tendency to shrivel or change in size during immersion in water. This is imperative to good metal protection. For good protection depends on good adhesion, and a paint film maintains better adhesion when it is not distorted by the action of the water.

* * *

Remember, too, Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including the fast-drying resin types.

Specify RED LEAD for ALL Metal Protective Paints

The rust-resistant properties of Red Lead are so pronounced that it improves any metal protective paint. So no matter what price you pay, you'll get a better paint if it contains Red Lead.

WRITE FOR BOOKLET—"*Red Lead in Corrosion Resistant Paints.*" This authoritative guide is available to those responsible for specifying and formulating paints for structural iron and steel. It describes in detail the scientific reasons for Red Lead's superior protection. It also includes typical specification formulas. If you haven't received your copy, address nearest branch listed below.

* * *

The benefit of our extensive experience with metal protective paints for both underwater and atmospheric use is available through our technical staff.

NATIONAL LEAD COMPANY: New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, W. Va., (Evans Lead Division).

DUTCH BOY
Reg. U.S. Pat. Off.
RED LEAD

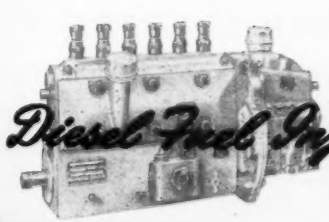
For additional information, use postcard, pages 125-126

EXPERIENCE ..at your Service

At American Bosch, engineering experience born of years of doing is at the service of Diesel users everywhere. Pooled with the Diesel Builders' own knowledge, this specialized fuel injection experience is at work today on the better, lighter, more efficient Diesels of the future.

Production skill and capacity which have kept pace with the industry's growth bring the engineers' work to reality. Widespread field service keeps the equipment operating efficiently.

Thus American Bosch experience serves from the conception of the engine to the product at work, which may serve to explain why a majority of America's Diesel Builders equip their engines with American Bosch Fuel Injection. AMERICAN BOSCH CORPORATION, Springfield 7, Mass.



Diesel Fuel Injection

AMERICAN BOSCH

AUTOMOTIVE AND AVIATION ELECTRICAL PRODUCTS

For additional information, use postcard, pages 125-126

Weed & Grass Control ... PLUS Permanent Improvement of Road Bed

BYSULOX C

Toxic Oil Weed Killer & Soil Sterilizing Agent

GENERAL CHEMICAL RESEARCH makes another significant contribution to the science of chemical weed killing with Bysulox C—*the fortified toxic oil weed killer.*

Here is a truly advanced, highly penetrating oil blend which gives quick kill of weeds and noxious grasses with more permanent results than have ever been obtained with any other spray material.

Used alone or in combination with Bysulox A, Bysulox C materially increases soil sterilization and suppression of re-growth. Its blend of toxic oils is more waterproof, with longer-lasting efficiency. Bysulox C is not subject to quick decomposition or neutralization as are the commonly used, unstable water soluble salts.

Bysulox C creates a condition of ballast and soil which is intolerant to the support of weeds and grasses or to successful germination of seeds. According to the quantities used, applications may be planned to produce this sterilizing condition gradually or quickly, as desired.

With such advantages, Bysulox is the answer to your 1947 weed and grass control problem.

For information on Bysulox treatment as applied to your particular needs, consult

GENERAL CHEMICAL COMPANY

Weed Killer Division

40 Rector Street, New York 6, N. Y.

See our exhibit at Booth 31

National Railway Appliances Association Exhibition, Coliseum, Chicago, March 17-20.

BYSULOX KILLS GRASS

For additional information, use postcard, pages 125-126

INDEPENDENT ROPE SHOVEL CROWD

2 CRAWLER SPEEDS (STANDARD)

UNIT ASSEMBLY—EASIER SERVICE

5 IDENTICAL CLUTCHES

LIGHTS (STANDARD EQUIPMENT)

"FULL CIRCLE" CRAWLER STEERING

DROP-FORGED CRAWLER TREADS

ANTI-FRICTION BEARINGS

OIL-ENCLOSED CRAWLER PROPELLING MECHANISM

STARTER AND GENERATOR (STANDARD)

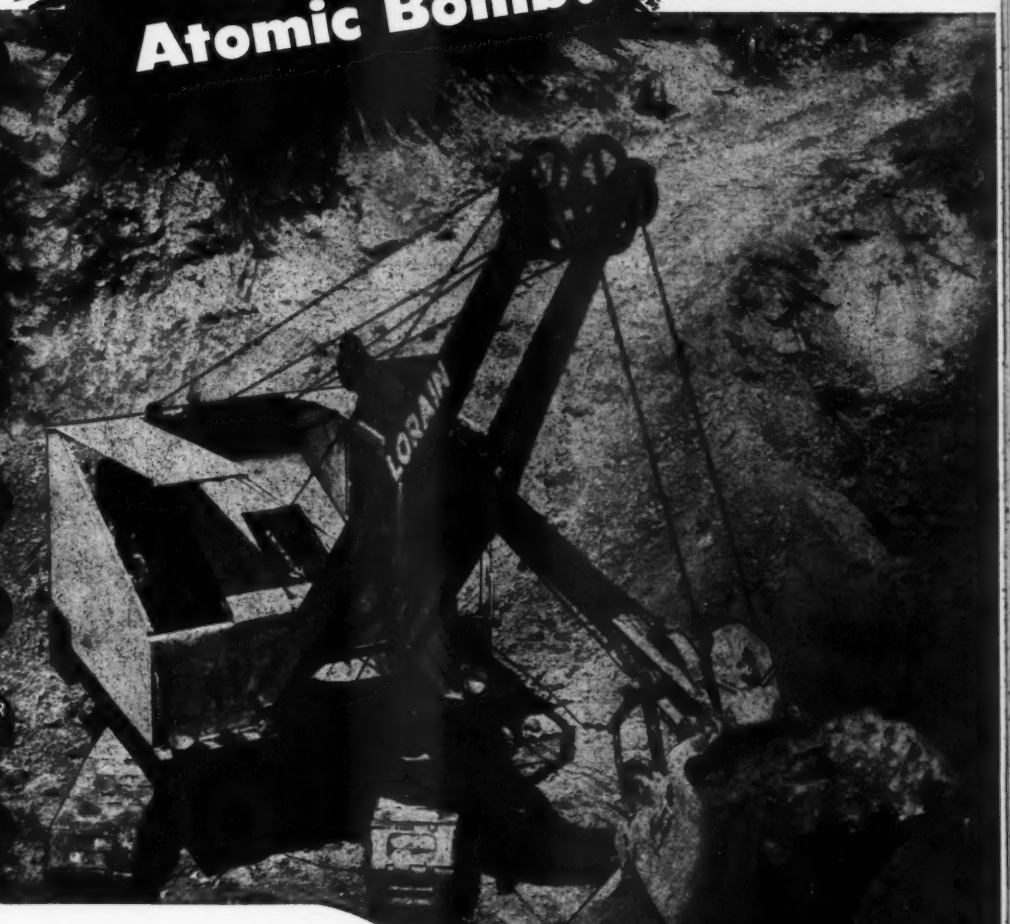
9 RUBBER-TIRE MOUNTINGS AVAILABLE

ELECTRIC DIPPER TRIP AND TAGLINE

INTERCHANGEABLE PARTS

ALL-PURPOSE CRANE BOOM

It's small... but so was the Atomic Bomb!



• It takes "know how" to pack a lot of action and quality into a small package. The TL-20 offers features in turntable, mountings and boom equipment that bring new life, action and profits to shovels and cranes in the ½ yd. class.

Check the features above, then see your local Thew-Lorain distributor for an early demonstration of the TL-20—the year's biggest small machine value.

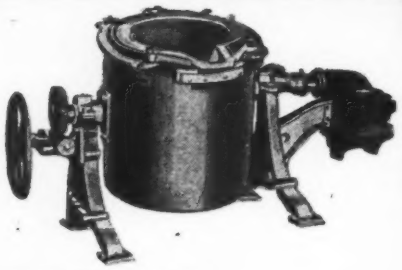
THE THEW SHOVEL COMPANY • LORAIN, OHIO

Lorain TL-20

INDUSTRIAL FURNACES

OVENS • MELTING FURNACES

INDUSTRIAL HEATING FURNACES



MELTING FURNACES—for melting aluminum and magnesium. Electric, gas or oil fired.

Designs by Campbell-Hausfeld, Fisher, Stroman and others.

OVENS—for baking lacquer, enamel, synthetic resin, japanning, for low temperature metal heat treating, for drying and curing chemicals, rubber, paper, lithographing, plastics, ceramics, etc.

Made by Despatch, Gehnrich and Gehnrich, Maehler, Young Bros., W. S. Rockwell, Surface Combustion, Porbeck, General Electric, Stewart and others.

INDUSTRIAL HEATING FURNACES—

Continuous and Batch Type
Rotary Hearth
Tunnel Type
Box Type
Atmospheric Control Type

Made by these well-known manufacturers: American Gas Furnace Company, Dempsey, Despatch Furnace Company, Electric Furnace Company, Gas Machinery Company, Industrial Heating Equipment Company, Ingersoll-Rand, Lindberg, Whiting Corporation, General Electric, and many others.

These furnaces are products of the best American manufacturers. They have recently been declared surplus and are now ready to take their places on industry's production lines, to be counted again among the country's industrial assets. Every furnace is priced far lower than you have ever thought possible. Now—this very day—is the time to learn the details concerning the furnaces offered. Write, phone or visit your nearest WAA Regional Office.

Principal inventories are located at Boston, New York, Philadelphia, Richmond, Cleveland, Detroit, Chicago, St. Louis, Minneapolis, Cincinnati. However, any WAA Regional Office is prepared to give complete information and arrange for purchase. All furnaces offered subject to prior sale.

All furnaces are sold under existing priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area, and then to purchase the materials offered herein.

Exporters: Your business is solicited. If sales are conducted at various levels, you will be considered as a wholesaler. Any inquiries regarding export control should be referred to Office of International Trade, Department of Commerce, Washington, D. C

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GOVERNMENT OWNED SURPLUS

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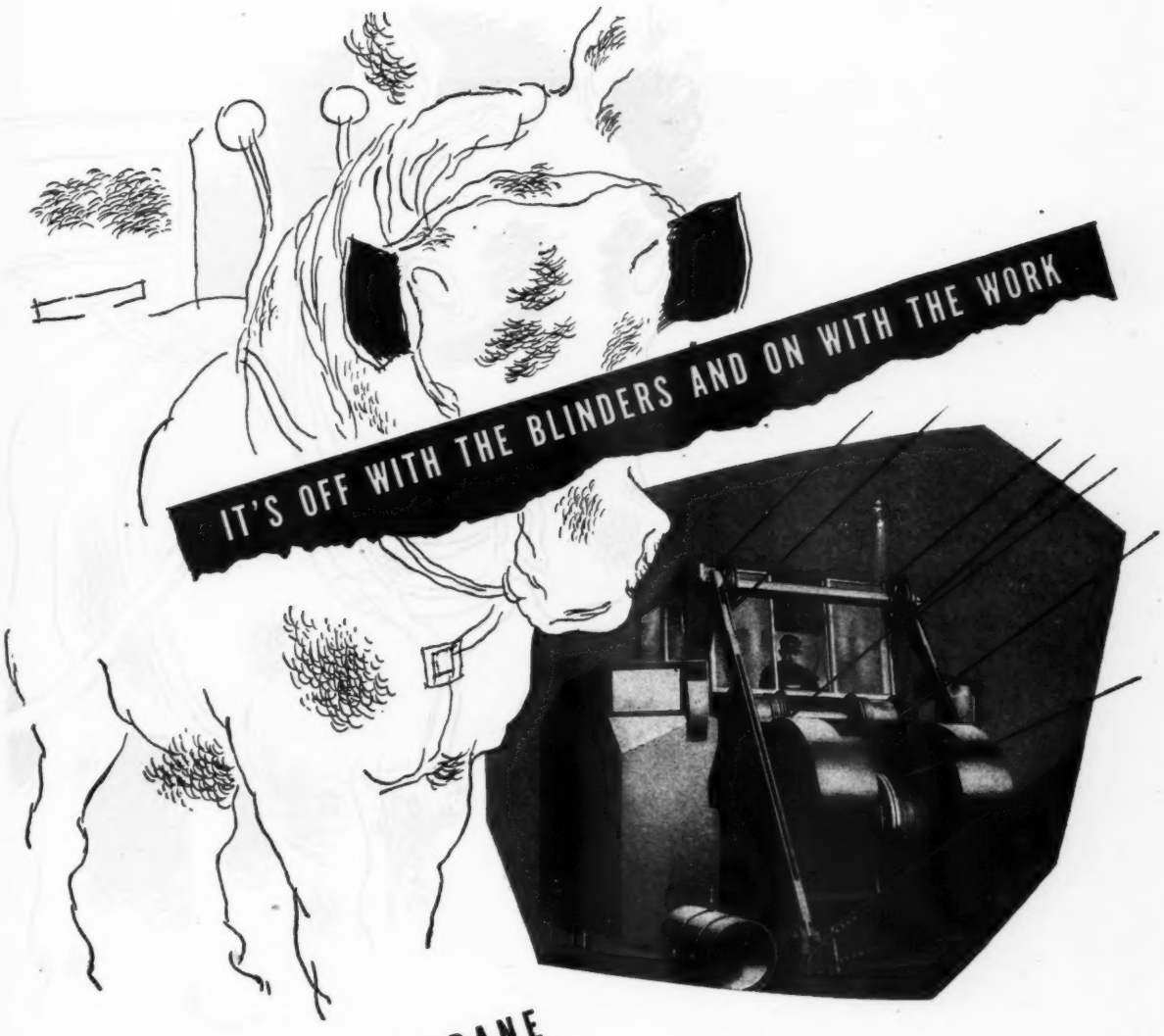


IN AN I.B. LOCOMOTIVE CRANE

The Monitor-type cab of the I.B. locomotive crane takes the "blinders" off the crane operator, affords him unrestricted vision in every direction—front, back, and both sides. That means increased operating ease, safety, and efficiency, because the full circle—360°—visibility eliminates "blind spots" which might necessitate awkward crane maneuvering and hazardous guesswork. Additional I.B. refinements include positive response to air-operated controls placed within easy reach of the operator; anti-friction bearings at all essential points; one-piece cast steel bed; rotating and travel friction disc clutches with 1-point adjustment; 14" safety clearance between rotating bed and car body; fully insulated and well ventilated cab . . . and they all add up to safe, swift materials handling with hook, magnet, or bucket at lowest maintenance and repair costs.

Write for complete facts.

INDUSTRIAL BROWNHOIST BUILDS BETTER CRANES

INDUSTRIAL BROWNHOIST CORP. • BAY CITY, MICH. • District Offices: New York, Philadelphia, Cleveland, Chicago • Agencies: Detroit, Birmingham, Houston, Denver, Los Angeles, San Francisco, Seattle, Vancouver, B.C., Winnipeg, Canadian Brownhoist Ltd., Montreal, Quebec.

36 Years of Railroad Weed Control Service . . .

That's your assurance of:

- Dependable chemicals.
- Common sense analysis of your weed problem.
- Workmanlike equipment.
- Nationwide facilities.

Now is the time to plan your 1947 weed control program. Call on us to help you . . . we can recommend and provide the right chemical weed killer to suit your condition.

CHIPMAN CHEMICAL COMPANY, Inc.

Chicago, Ill. Houston, Tex. Palo Alto, Calif. Bound Brook, N. J. Portland, Ore. No. Kansas City, Mo.

Manufacturers of

ATLACIDE CHLORATE WEED KILLER and ATLAS "A" ARSENICAL

also **Chipman 2,4-D Weed Killer** and **CHLORAX Weed Killer**


THE DIESEL-POWERED NATIONAL LIMITED, B&O'S WASHINGTON-ST. LOUIS TRAIN
HIGHER SPEEDS with MODERN TRAINS require higher track standards which include adequate anchorage with Dependable RAIL ANCHORS
THE P. & M. CO.
CHICAGO • NEW YORK • DENVER CLEVELAND • ST. PAUL
WASHINGTON • ST. LOUIS BOSTON • SAN FRANCISCO

FAST TRACK for the Katy Komet

Clean, weed-free track is an important factor in helping to keep the Katy Komets, Katy Klippers, Katy Packers, Bullets, Rockets rolling on their fast freight schedules. To maintain this type of fine track, the Missouri-Kansas-Texas, along with more than 75 other major railroads, employs **WOOLERY WEED BURNERS** to help keep its right-of-way in good condition.

To facilitate weed elimination, at the lowest cost per track mile of operation, use **WOOLERY WEED BURNERS.**

We invite your investigation. Let us give you operating cost and performance data.

WOOLERY MAINTENANCE EQUIPMENT

TIE-CUTTERS—WEED BURNERS
—CREOSOTE SPRAYERS—

WOOLERY WEED BURNERS
Available in
5-BURNER
3-BURNER
2-BURNER
1-BURNER
models

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS · MOTOR CARS · TIE CUTTERS · TIE SCORING MACHINES · RAIL JOINT OILERS · CREOSOTE SPRAYERS · BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

The Embarrassment of Success

EVERY now and then a manufacturer succeeds in making a product so outstanding that public demand for it overwhelms production facilities. In his zeal for winning friends he finds himself making enemies — people eager to buy who cannot be assured immediate or even early delivery.

Thus, the earnestness the manufacturer has given to years of research and development — of product improvement and still better product performance—of efficient manufacture and unusual customer service . . . seems to come back to haunt him.

It is the embarrassment of success.

In becoming the world's leading manufacturer of Diesel engines, track-type tractors and motor graders, "Caterpillar" found many buyers forming a waiting line during the years when all products went into war use. To that waiting line were added many more whose favor was won by the illustrious war performance of these machines.

Thus, despite the fact that "Caterpillar" production is at a high point, demand is still outrunning supply. To catch up—and also to provide an extra margin of facilities for future needs — production is being increased as rapidly as possible by an expansion program that is adding *50 per cent more plant.*

"Caterpillar" is deeply conscious of the problems of the many users who prefer and patiently wait for "Caterpillar" products. "Caterpillar" thanks every customer for such patience in awaiting his turn on deliveries. You can be sure that "Caterpillar" effort is the human utmost. It is live, resourceful — determined that, even in the face of material shortages and disturbed economic conditions, there shall be no unnecessary delays.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR Diesel

REG. U.S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

That "Strange Click-Clack in the back of the sacroiliac" is more than just a line from a song, as many a locomotive crane operator knows. But even after eight straight hours of work, the man in the cab of an AMERICAN Locomotive Crane doesn't have that aching back or that fatigue which cuts production. Why? Because his controls all respond to finger-tip pressure. Because they give him smooth, precise action in every motion. Because his seat, his levers, his entire cab, are thoughtfully designed for *utmost work with least fatigue.*

American Hoist
and DERRICK COMPANY

Saint Paul 1, Minnesota

Plant No. 2: South Kearny, New Jersey
Sales Offices: New York • Pittsburgh • Chicago
San Francisco • New Orleans

America's Number One

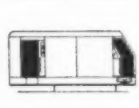
Locomotive Crane

Ask the man in the cab!

GASOLINE • DIESEL
DIESEL ELECTRIC
LOCOMOTIVE CRANES

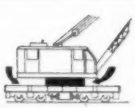
CAPACITIES 25 to 40 TONS

738



NO DANGEROUS SWINGING DOORS

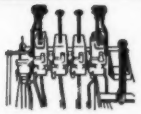
ENCLOSED ROLLER-BEARING TURNTABLE



14-INCH "LIFEGUARD" DECK CLEARANCE

WIDE ANGLE *WORK* VISION

ENCLOSED, OIL-BATHED TRANSMISSION



AIR POWERED ANTI-FATIGUE CONTROLS

How to Reduce Rail Cropping Costs

Save the time and expense involved in hauling rails long distances to a central plant for cropping.

The Airco portable rail cropping machine enables you to set up a rail cropping plant at any point along the right of way convenient to the job and to move it quickly to suit changing requirements.

You can even crop rails in the track when necessary. Weighing only 61 pounds, the Airco portable rail cropping machine is easily moved about by one man.

Employing two highly-efficient oxyacetylene flame cutting tips, it will produce as many as 30 cuts per hour, giving a quality surface that requires a minimum of grinding.

For complete information on this modern maintenance machine, mail the coupon for illustrated four page folder. Address Air Reduction, 60 East 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas.

AIRCO **AIR REDUCTION**

Offices in All Principal Cities

Costs Come Down Under the Airco Plan

REM

AIR REDUCTION
60 East 42nd Street
New York 17, N. Y.

Please send a copy of the Rail Cropping Machine folder to

Mr._____

Title_____

Road_____

Address_____

City_____ Zone_____ State_____

Quality

These "Grade Trade-Marks" Identify Every Panel of Genuine Douglas Fir Plywood

Every type and grade of Douglas fir plywood is readily identified by one of these "grade trade-marks". Such a mark on a plywood panel is your assurance that rigid standards of quality have been met throughout the manufacturing process — and that the panel has been made especially to meet the particular use for which the grade was originated.

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In Countless Applications — in Peace and in War — Douglas Fir Plywood Has Proved Itself

More Fir Plywood Soon Will Be Available for All Uses

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To speed up your tie tamping operations, we suggest you investigate the MT-3 tamper and also I-R air compressors for the air power — both off- and on-track units are available.

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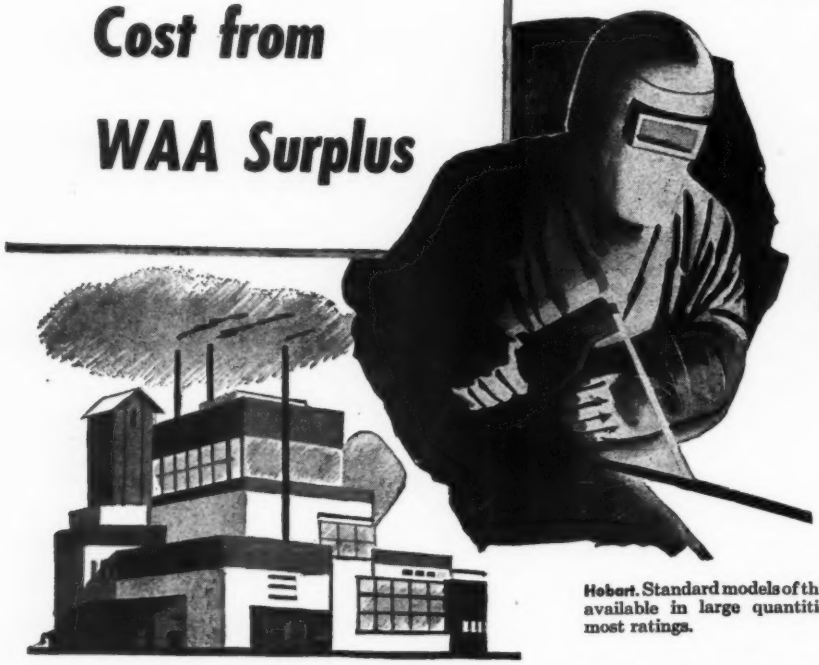

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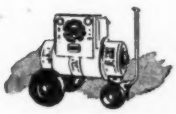

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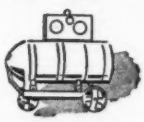

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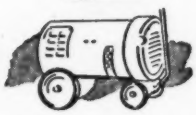

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For additional information, use postcard, pages 125-126

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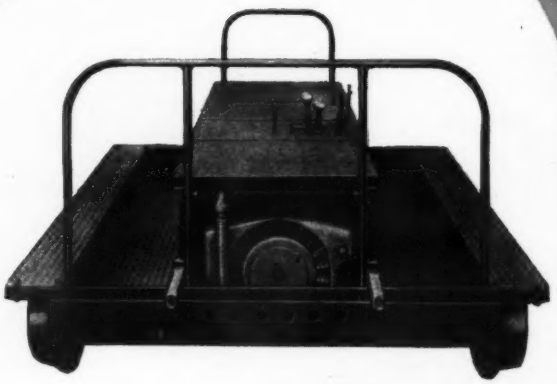

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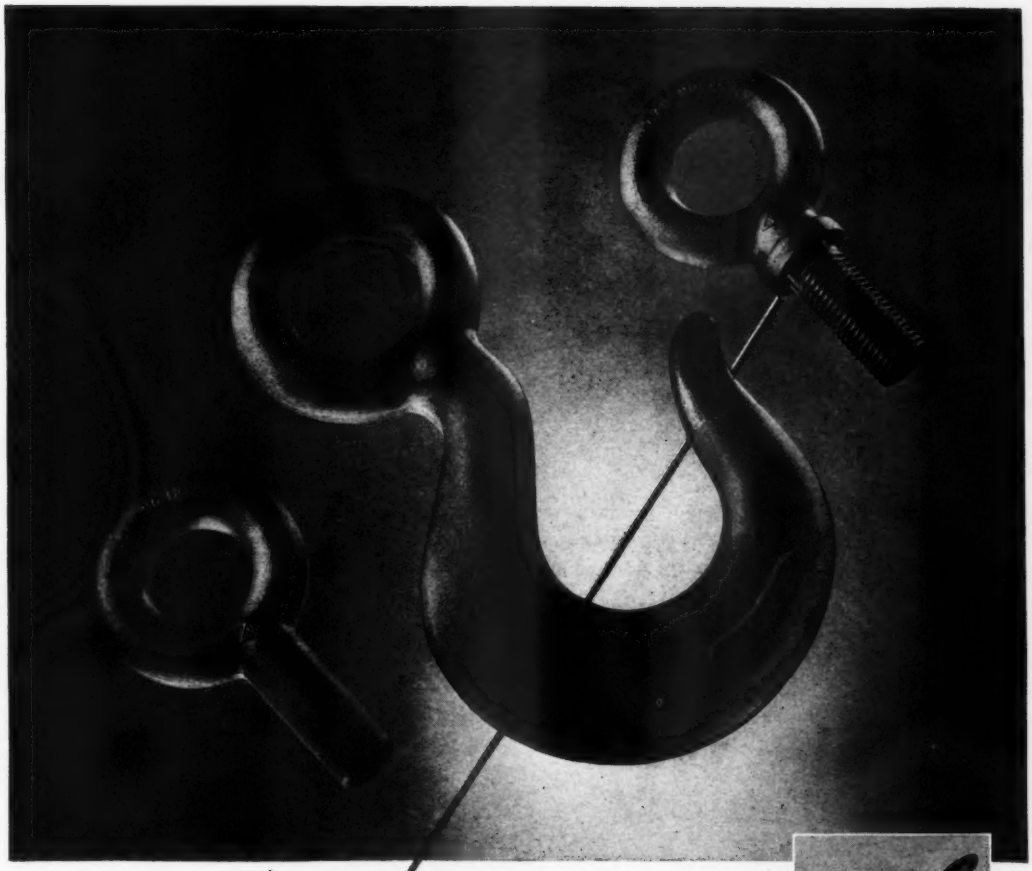

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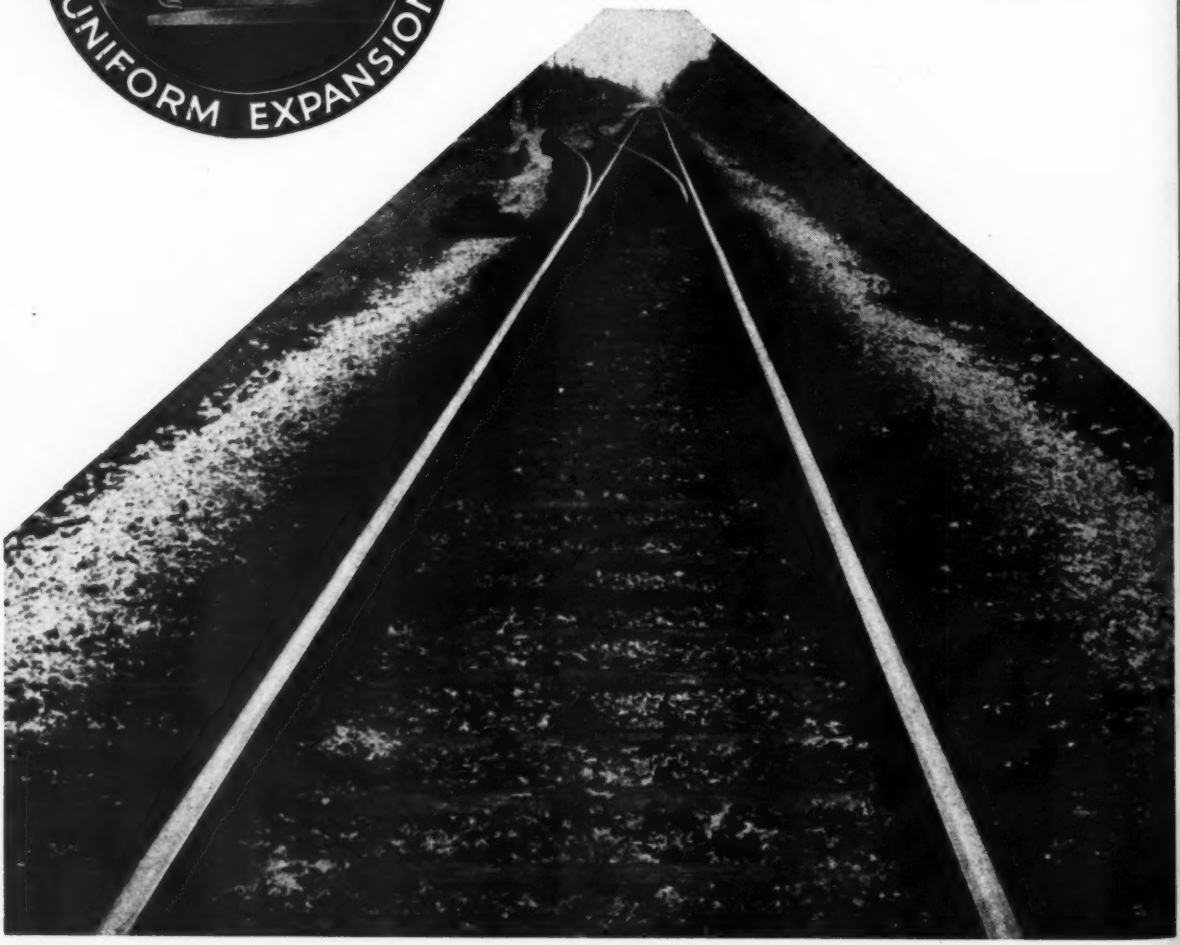

ADDITIONAL INFORMATION

On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

Products Index

PRODUCTS INDEX (Continued)

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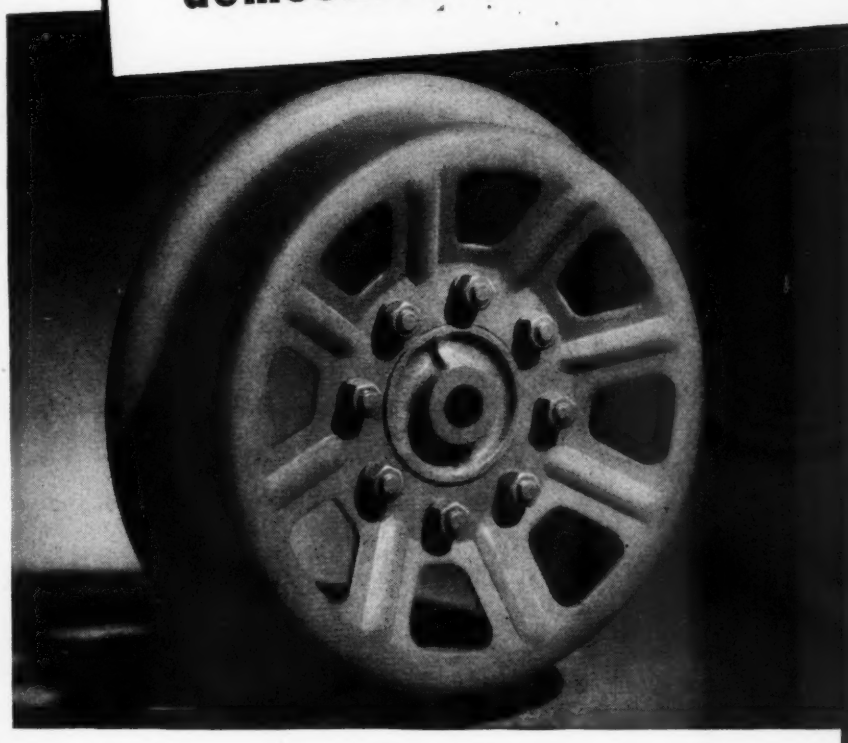

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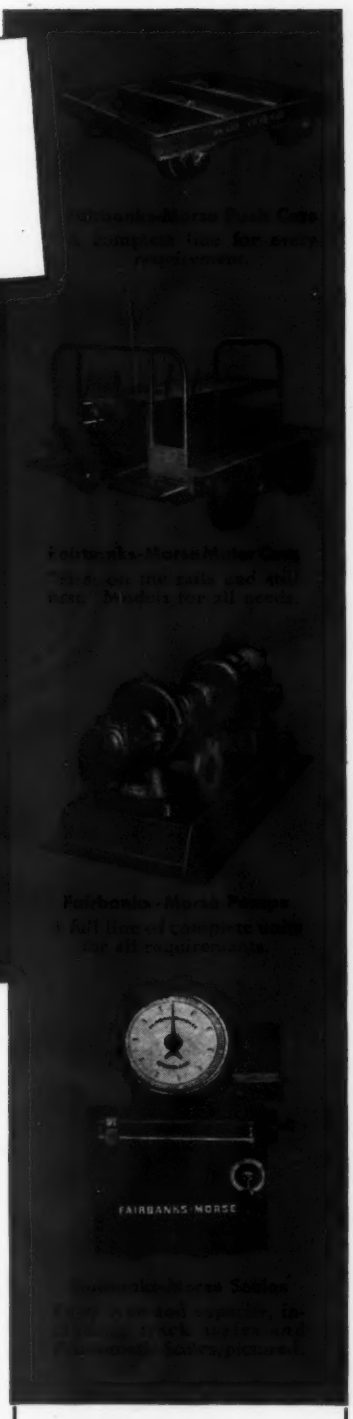
It can be mounted or demounted without special tools, and will give ideal service on motor, trailer, or push cars. You are assured absolute uniformity in every wheel, because Fairbanks-Morse rigidly controls every step of manufacture.

Products of 117 years of production experience, they have been proved the lightest and strongest track car wheels on the rails today. Available in standard A.R.E.A. 16- and 20-inch sizes, plus a newly developed 14-inch wheel. Send this coupon now for the new descriptive bulletin.



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"Tractair" mobility is ideal for station platform maintenance

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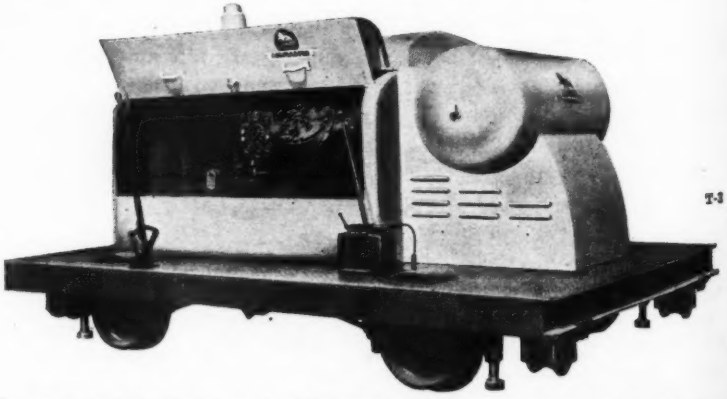

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Subject: A New Service to You

February 1, 1947

Dear Readers:

With this issue, Railway Engineering and Maintenance begins another service to you—a two-part service. Essentially, this involves (1) the inclusion in each issue, on tinted insert paper stock, an index to all the products described in both the editorial and advertising pages, and (2) as a part of this same insert, two permit-stamped, addressed post cards on which you can, by simple page references, request additional information on any of the products mentioned.

In part, this expedient to give you a ready reference to products is not new, because, until eliminated during the depression, we presented an index of advertised products in every issue. But now, in restoring the practice, we go beyond this and present an index of all products of any importance mentioned anywhere in each issue, including the feature-article, new-products and trade-publication columns, as well as the advertising pages. If you are interested in any particular type of product, whether a material, machine, appliance or tool, you will find all page references in one location—and along with them, cards on which, with minimum time and effort, you can request additional details if you desire them.

As is clearly indicated on the Products page, all you need do in making your requests is to name the product or products and corresponding page numbers, and fill in the lines reserved for your name, position, railroad and address. These cards will be received in our New York office where we have set up a system for forwarding them to the various manufacturers involved, who, in turn, will be asked to comply with your requests—without any obligation to you, of course.

We have given a great deal of thought in establishing this new service, discarding many other possible methods to the same end, and hope most sincerely that it will prove of real value to you in convenience and in bringing you promptly the supplemental information you may want. We hope, too, that you will feel free to make liberal use of this service, because, to the extent that you use it we will have achieved our goal—more service to the readers of Railway Engineering and Maintenance.

Sincerely,

Neal D. Howard
Editor

NDH: jb

Men and Machines MAKE PERFORMANCE ON THE JOB COUNT

The Building and Bridge Foreman. Like the sturdy girders he places, the B&B Foreman typifies that individual responsibility and trustworthiness that have made American Railway travel the safest transportation in the world.

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Maintaining bridges frequently requires large crews and heavy loads of material. Transportation to the job requires speed, too—the urgency of vital need.

Thoroughly comprehending the requirements, Fairmont provides a Railway Motor Car of great capacity, power and speed within safety. The A5, Series C Gang Car in high gear on a level track can easily pull ten trailers, loaded with 200 men, at 30 miles per hour. A four-speed transmission supplies complete flexibility for varied requirements.

Fairmont takes pride in supplying Railway Motor Cars that feature complete adaptability, economy, and rugged durability.

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Railway Engineering and Maintenance

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FEBRUARY, 1947

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Railway Engineering and Maintenance

Then and Now—

Post-War Periods I and II Afford Interesting Comparisons

Railway officers and employees the country over, with the welfare of their industry and the fortunes of themselves and their families involved, have been peering eagerly into the future since the turn of the new year, seeking the answer to what lies ahead. To many it has been like crying in the wilderness—there is no answer. To others the impacts of recent events and trends have come so rapidly and from so many sources and directions that the answer is fogged and confused. Indeed, it is given to no one to know with assurance what the future has in store, but those who appear to hold the soundest views, with the greatest likelihood of fulfillment, are those who see the future reflected in the storehouse of experience provided by the past.

A long and ardent student of railway affairs, who is prone constantly to seek wisdom and future trends out of the past, is Samuel O. Dunn, editor of Railway Age for the last 35 years and chairman of the board of the company which publishes *Railway Engineering and Maintenance*. So often have his counsel to the railways and prognostications of future trends and events been sound and accurate that we take the liberty here, in the interest of our readers, of quoting from his lead editorial in the January 4, Annual Statistical Issue of Railway Age, entitled Railroads Enter a New Era, in which he views the outlook for the present post-war period in the light of the similar period following World War I.

After pointing out some differences that have prevailed with respect to wage and freight rate increases following the two wars, the editorial says, "On the whole, however, the economic pattern followed since V-J Day has been similar to that followed after the Armistice in 1918. The year which has just ended corresponded roughly with 1919. The year we have just entered corresponds roughly with 1920. Business was more adversely affected by strikes in 1919 than in any previous year. It was again more adversely affected by strikes in 1946 than in any previous year. Production and traffic declined in 1919. Production and traffic declined following V-J Day. They increased and exceeded all previous records in 1920. Their trend was definitely upward in the latter part of 1946, and they may well exceed all previous records in 1947.

"The depression-minded not only predicted that freight traffic would decline, but that it would decline greatly, following World War II—probably to the level of 1941. They foresaw a slump in construction and production and eight to twelve million unemployed early in 1946. Their prophecies completely failed of fulfillment. Employment reached a new high level. Freight traffic handled by the railroads last year was, excepting the recent war years, the largest in history—40 per cent larger than it averaged in 1923-1929; 30 per cent larger than in 1929, and 25 per cent larger than in 1941. It would have been larger still if there had not been so many strikes, especially in the coal mines, and if the railroads could have handled more. And there was no sign at the beginning of the New Year that the demands of freight traffic would not continue to exceed railroad capacity indefinitely."

Turning to the highly important factor of population and economic conditions prevailing in the two periods immediately preceding the two post-war periods under consideration, the editorial continues:

"The most fundamental factor determining economic needs and developments is population. Population determines how many people have to be provided for and how many workers there are to provide for them. The population of the United States has increased about 35 million since 1920—as much as it increased from 1896 to 1920. But there have been great

differences between the periods 1896 to 1920 and 1920 to 1947. The former was a period of almost uninterrupted increase of construction, production and traffic, while the 27 years since 1920 have included more than a decade of the worst depression in history, during which expansion of construction, production and transportation was almost halted."

"Railroad investment is now about $7.5 billion more than in 1920. But almost all this increase in investment was made during the last post-war period. The increase in 1930 over 1920 was $6.6 billion. This increase in investment not only provided needed increased capacity, but helped to effect large economies in operation. The rehabilitation of railway properties was accomplished not only by increase in investment but by increase in expenditures for maintenance. Total annual expenditures for maintainence averaged about $1.1 billion in the decade ending with 1919 and about $2.2 billion in the decade ending with 1929."

After these significant facts with respect to what happened in the years immediately following World War I, it is pointed out that, increased by 35 million since 1920, the nation's population today is demanding a much greater increase in construction, production and transportation per capita than in 1920 to 1931, and that if the expansion of construction and production is going to be large enough, first to remedy the unprecedented shortages of almost everything that have accumulated since 1930, and, second, to raise the standards of living of our enlarged population as they were raised before 1930, the handling of future traffic will require a much larger expenditure for railroad rehabilitation, improvement and expansion in this post-war decade than was made in the last post-war decade.

Equally as significant as the foregoing comparison and analysis is a statement in the same annual review and outlook issue of Railway Age by James G. Lyne, assistant to the editor, summarizing an article under his signature entitled, Stage Set for Large-Scale Improvements, in which he says:

"With post-war railroad traffic volume affording convincing evidence that America has bidden goodbye and good riddance to the policies which kept production low and unemployment high throughout the 'thirties, it has become imperative that the railroad plant, shrunken to conform to the meager demands of the 'thirties, be now expanded to correspond to the new level of national economic vitality.

"The railroads have no mere war-time let-up in maintenance and improvements to counteract, but must also catch up on the shrinkage they suffered in the 'thirties. Armed with large funds husbanded from war-time earnings, plus the added encouragement of the recent modest increases in freight rates, the railroads appear to be ready to press forward with the biggest program of rehabilitation and improvement in their history."

Many well-informed see a recession from present levels of economic activity in the year immediately ahead, similar to, but less severe than, that in 1921, and such a possibility is not to be overlooked, nor is it entirely precluded in the foregoing comparisons and estimates of what lies ahead. In spite of any such recession, however, it would appear that, with true statesmanship among labor, management (including railway management) and government, which appears in the ascendency in all three quarters, the stage is set for a prolonged period of prosperity in the United States.

"Detour" Sections—

Using Them to Best Advantage

TO AN increasing extent the maintenance forces of railroads with multiple-track lines are finding it desirable and feasible to use the "detour" system when performing out-of-face track-maintenance operations. Under this system the track on which work is to be performed is set off in sections of convenient length, say 10 to 15 miles, temporary crossovers are installed if necessary, and traffic is detoured around the sections to permit the work to be done in the clear.

There is nothing new in the idea of "killing" track while important work is carried out, but until recent years the maintenance forces on most railroads were unable to obtain the cooperation of their transportation departments in putting into effect a policy under which this is done as a routine matter, with the sections of "dead" track limited to relatively short stretches of uniform length by means of temporary crossovers. From the viewpoint of the track forces this system has obvious advantages, which hinge largely around the benefits accruing when track work can proceed without serious interruption by passing trains.

However, generally speaking there can be little hope of getting the system adopted as a regular and continuing practice unless convincing arguments can be marshalled to show that it also has advantages for the transportation department. Whether this can be done will depend to a considerable extent on the use that is made of the "detour" sections. If a policy is established of concentrating as many operations as possible in each section as it becomes available, thereby minimizing slow orders and other possible traffic interruptions elsewhere throughout a considerable territory, the transportation department will not only have little cause for opposing the idea but, if the experience of a number of roads is any criterion, will be likely to extend its active cooperation.

In fact, the concept of taking full advantage of the detour sections to perform a variety of operations should appeal strongly to the maintenance forces because of the effect it will have in multiplying the savings possible even if only one or two operations are performed in the detour section, with the remainder being done at other locations under traffic.

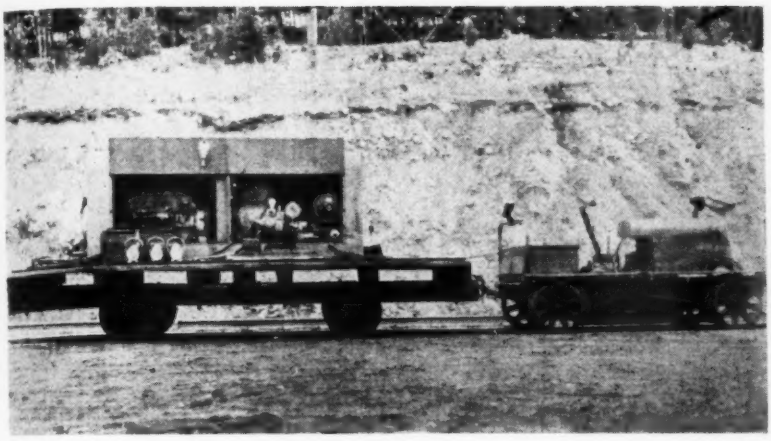
Annual Index—

How You Can Obtain a Copy

FOR SEVERAL years the practice has been followed of printing only sufficient copies of the annual index of *Railway Engineering and Maintenance* to meet the needs of subscribers making specific requests for them, and the same policy is being continued this year. The index for 1946 is now ready, and those subscribers who have requested copies in previous years will receive a copy of this index automatically. If you have not requested a copy of the index in prior years, but want a copy of the 1946 index, all you need to do is fill out the coupon on page 133 of this issue.

Testing with Magnaflux on the D. & R. G. W.

The Portable Track-Mounting Unit Used in Magnaflux Testing on the D. & R.G.W.



By RAY McBRIAN

Engineer of Standards and Research
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This article is based on remarks made before a railroad Magnaflux conference held at Chicago, at which Mr. McBrian was chairman of a section on the inspection of track, tools and parts during reclamation. It describes the practices and experience of the Denver & Rio Grande Western in testing by this method of various components of the track structure as well as track tools and other items used by the maintenance of way and other departments.

CONSIDERABLE use is being made on the Denver & Rio Grande Western of Magnaflux, and similar aids, for testing purposes in maintenance of way work. The parts being tested include rails, joint bars, welded joints, track tools, chains and others. Incipient defects, mostly of a surface nature, are being detected in time to permit the defective parts to be removed from service or repaired before the danger point has been reached. Magnaflux, to put it briefly, is a means of testing by which the part to be tested is magnetized and then sprayed with a special powder which is drawn to, and accumulates along, the length of discontinuities present.

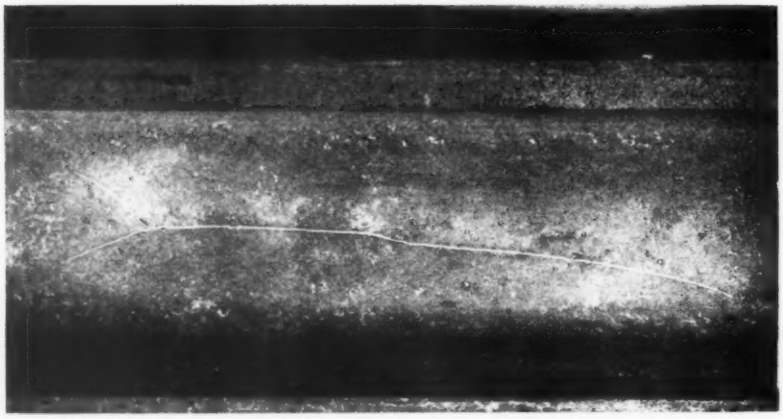
For testing rails, joint bars and welded joints, as well as certain other track parts, we use a portable track-mounted inspection unit, consisting of a General Electric 40-volt, 300-amp. generator set, driven by a Waukesha gasoline engine. The unit is mounted on a push car and is pulled by a standard motor car. Included as an essential part of the unit is a small generator set capable of driving two portable grinders or power brushes.

One of the purposes for which we have used the portable outfit is the testing of welded joints in the Moffatt tunnel. This tunnel is 6.2 miles in length and contains approximately 1,900 joints. When the joints in this tunnel were first welded some years ago, the older type Thermit weld was used, which required the drilling of a hole in the end of each rail to permit the use of a clamp for pulling the rail ends together during the welding operation. Due to steam operation in the tunnel corrosive conditions are severe. Because of alternating abrasive and corrosive action about ⅛ in. of metal is lost from the running surfaces each year. With the original

Above—Typical Indication, as Obtained by Magnaflux, of a Crack in the Top Surface of a Joint Bar. Below—This Crack, Found in a Rail on a Curve, Indicates the Presence of a Compound Fissure

welds it was found that, when the head of the rail had been worn down a certain distance, the stress in the webs around the holes was increased to a point where stress-corrosion cracks were produced. Defects in some of the welds were also observed.

When these defects were first noticed it was decided to determine their nature and severity by means of the portable Magnaflux unit. All the welds and bolt holes were inspected and the information obtained was used



Above—The Presence of this Web Crack Was Brought Out by Magnaflux. Most Such Cracks, Because of the Bleeding of the Metal, Can Be Seen by the Track Forces

Left—Fillet Cracks Such As These Were Found by Magnaflux and Their Cause Revealed by Stresscoat

as a basis for determining whether the rails should be replaced. The method of inspection, using the portable unit, was to send the current through the rail in the vicinity of the weld and around the bolt holes, and then blow the powder on with a hand bulb, after which the holes as well as the joint welds were observed at the same time. A few years ago new rail was placed in the tunnel and was welded by a later-type Thermit weld that does not require the drilling of a hole in the web of the rail. No inspection problems have been enountered to date with these welds.

Testing Joint Bars

Another application of the portable unit was the testing of the joint bars in a five-mile section of track. These bars were of the controlled-bearing type, and the reason for inspecting them was that some breakage was being encountered and it was desired to determine the nature and severity of the problem. The cracks causing the breaks were originating at the top bearing surfaces at the ends of the rails and were progressing downward. Using the portable track inspection unit, all the bars in the five-mile section were tested out-of-face, being removed from the track for this purpose. All of those found to have shallow cracks were ground, when this was found to be necessary, with the portable grinder to remove the cracks, and then replaced in the track. Those that were found to have cracks that were too deep for treatment in this manner were taken to the shop where they were slotted and welded and then ground so as to form a small easement on the top bar surface, after which they were replaced in service.

Rails at Road Crossings

It is also our practice to use the portable unit for testing the rails in road crossings at certain locations for bolt-hole cracks. This work is usually carried out in cities where there are a large number of road crossings and is done during the summer when repairs are being made at such crossings. Some of the bolt-hole cracks encountered at such locations are large enough to be seen by eye, but others were found to be just starting at the time repairs were being made. When it is considered that frequently these crossings are not disturbed for a period of two or three years after a general overhauling, it is apparent that the dictates of safety require that any defects present be found at the time the crossing is open for inspection. When such defects are found with the portable unit the rails are renewed. Formerly it was the practice to butt weld the joints in certain crossings, using an early oxyacetylene method without subsequent heat treatment, but after a considerable number of cracks had been found in such welds with the aid of a portable testing unit the practice of butt welding rails in road crossings by this method was discontinued.

We have also used Magnaflux in testing rails in open track for defects under certain conditions. The regular testing of rails on our road is done with Sperry detector cars which are usually operated in the spring and fall. However, after the passage of the detector car, and during the intervals between tests, we have encountered problems arising from rail failures, and for this reason we consider it necessary to have Magnaflux equipment available for detecting rail defects.

Several years ago during the winter we encountered particular trouble with rail failures in mountain canyons on six-degree curves. These failures were produced by the cracking out of defects known as compound fractures. These defects develop rapidly and result in sudden fractures. For inspecting such rails in track we use a portable device, operated by one man, for magnetizing the rails. Another man follows with a bulb to blow the Magnaflux powder on the rail. One of the illustrations shows a crack-out in the head of a rail, which was located in this manner. In one instance a total of 13 rails was removed from a curve following an inspection made in this manner, with as many as three crack-outs being found in one rail.

Finding Head Checks

A somewhat similar problem in inspection to which we have also applied Magnaflux is that of detecting head checks in rail. Although this problem may not be common on some railroads it is on ours because of the heavy grades encountered in the mountainous territory that we serve. Head checks comprise a defect that the electrical method of inspection sometimes does not detect. They seem to occur only in certain locations where the track is elevated for fairly high passenger-train speeds, but where large mountain freight locomotives, operated at relatively low speeds, cause excessive loads to be imposed on the gage-corner side of the low rail. Using the portable hand inspection unit we can determine the depth and width to which the head checks have progressed. When the depth has

reached a certain amount we know that the rails are in danger of failure and they are, therefore, removed from service.

As an aid in carrying out the various inspection problems encountered by our track forces we have placed a portable Magnaflux kit in the hands of all our track inspectors and all roadmasters. The plan eventually is to send such kits to all section forces. This unit consists of a tin box containing an Alnico magnet, a rubber bulb with a spray head, and a can of Magnaflux powder. In some cases where web cracks have developed the Alnico magnet and the Magnaflux powder have been used to bring them out. However, most cracks of this type can be seen by the track inspection forces due to the bleeding of the metal.

What About Fillet Cracks?

A special problem that has arisen on our railroad during the last several years, which has been solved with the aid of Magnaflux and another testing means that will be described later, is presented by the development of fillet cracks on the high sides of curves in rails only three to four years old. These cracks, some of which were located with the aid of Magnaflux, have occurred at random locations in the rail, and were not continuous. Their presence could not be explained at the time by any condition of the track or by the particular location of the rail in the curve.

To determine the cause of these cracks we employed a procedure involving the use of a product known as Stresscoat. This is a coating that is applied to the surface of the object under test. The nature and approximate extent of the stresses in the object are indicated by the action of the coating. For instance, if the object is loaded in compression, a flaking action will occur in the Stresscoat, while, if it is loaded in tension, cracks will appear in the coating at right angles to the direction of the applied load.

Tests were made with the Stresscoat at four different curves. Both sides of three rails on the high side of the curve were sprayed with the material and installed in each curve. For a 24-hr. period the rails were then examined after the passing of every train. It was found that on curves of 3 deg. and over, on which the speed of certain locomotives was restricted to 45 m.p.h., the operation of these locomotives at a speed in the neighborhood of 55 m.p.h. caused a compression flaking of the Stresscoat in the fillets on the field side of the outer rail and the formation of tension cracks in the fillets on the opposite side. The magnitude of the stresses thus indicated is shown by the fact that a stress of 65,000 lb. per sq. in. in compression was required to produce the flaking of the Stresscoat that was noted in the outside fillets of the rails.

Inspecting Track Tools

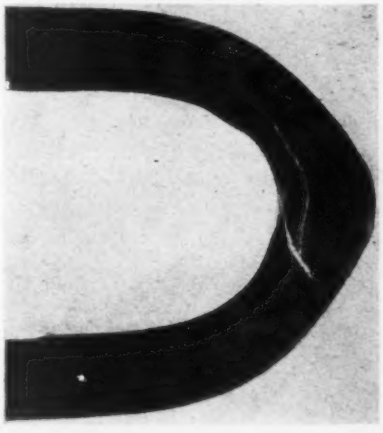
Another application in which Magnaflux is being used to good advantage on the D.&R.G.W. is the inspecting of track tools for defects. The program for doing this calls for inspecting all new tools as they are received; of all reclaimed tools, both before and after reclaiming; and of all tools in use on a periodic basis. The latter inspection was undertaken at the request of our safety department as the result of injuries occurring because of defective tools. For making the inspections the portable testing unit is used, being turned over to the roadmasters and track inspectors for this purpose at intervals.

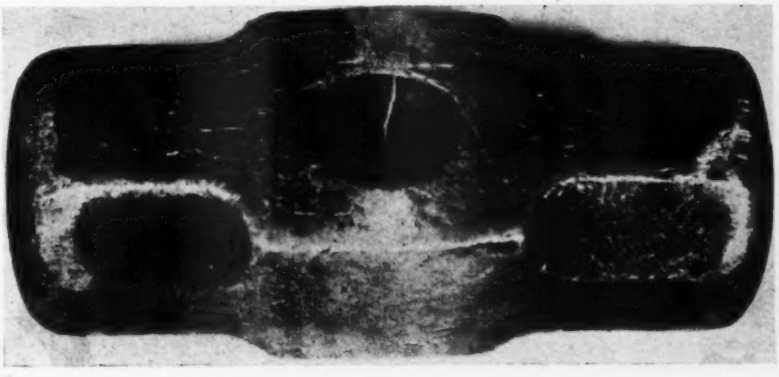
Regarding the inspection of reclaimed tools, it is our experience that many blacksmiths will try to reclaim tools almost regardless of their condition. This is economic waste, and to prevent it we have established the practice of inspecting such tools before they are reclaimed, and discarding those that are in bad condition. For the purpose of inspecting tools both before and after reclamation we have installed a small tool inspection unit in our research laboratory.

Defects in Chains

Still another application of Magnaflux on our road, which was also instituted at the request of the safety department, is the periodic testing of all the chains used by the maintenance, car, mechanical and freight-handling departments. This form of inspection was undertaken as a result of a number of accidents including damage to materials being handled, caused by defective chains. The plan is for each chain to be inspected every six months, being sent for this purpose to the nearest shop having a Magnaflux testing unit. The procedure is to wrap the magnetizing cable around the chain and then blow the powder on. Any defects found of a transverse nature causes the chain to be automatically scrapped.

The testing of so-called electric-welded alloy chains presents something of a special problem. On inspecting new chains of this type an indication is sometimes obtained at the electric welds when actually there is no defect. By cutting several of these open and making a study of them we have been able to establish a standard of what is acceptable and what is not, and have acquainted our Magnaflux operators with these findings. In other words, the successful testing of such chains requires that the operator have a background of knowledge and experience on which to base his judgment. Incidentally, an important aspect of all use of Magnaflux is the ability to make a proper interpretation of the findings.





Showing Defects Found by Magnaflux in a Chain Link (Right) and a Sledge Hammer (Below)

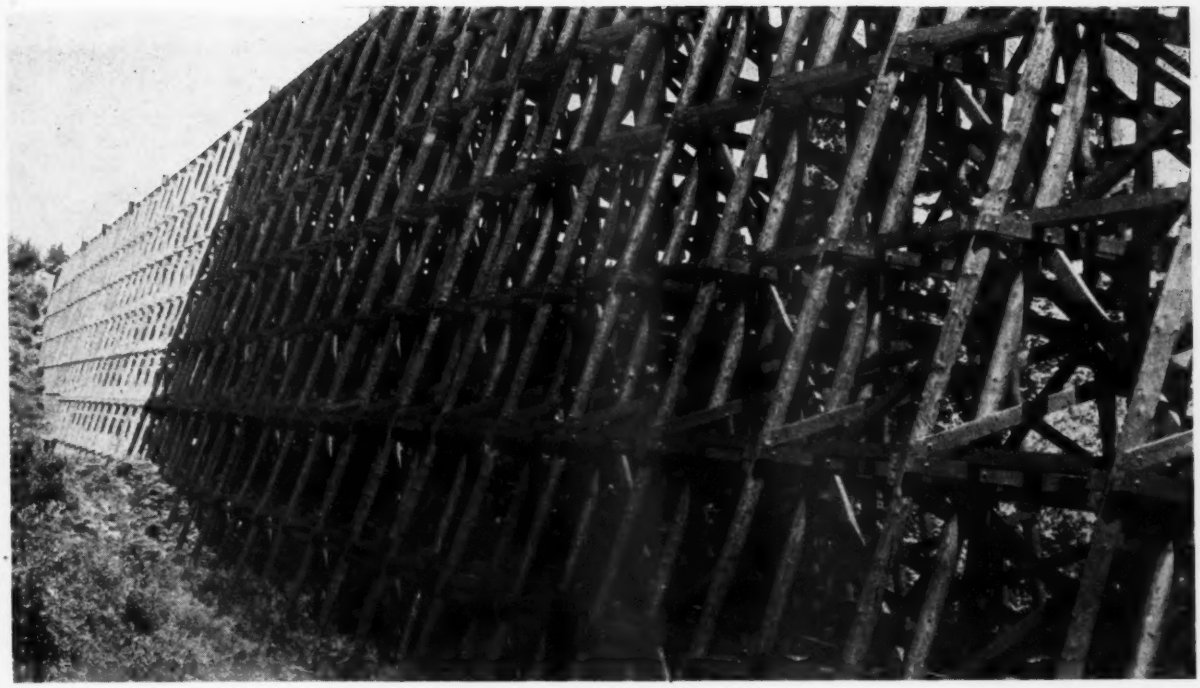
"Guinea-Pig" Bridge

Right—In the Temporary Framing Yard Near One End of the Bridge, Where the Bents Were Constructed in 24-Ft. Sections. Below—When an Entire Bent Had Been Completely Framed, the Sections Were Picked Up by a Locomotive Crane in Proper Sequence and Set in Place

Long, High T

When the Northern Pacific replaced its high, 66-span Wilburton trestle near Seattle, Wash., a couple of years ago, employing 32 spans of clean-treatment, frame-bent construction at one end and 34 spans of creosoted pile-bent construction at the other end, it set up an interesting experiment of both the relative merits of frame and pile construction in high timber trestles and of the comparative value of two kinds of treatment under similar conditions.

WHEN the Northern Pacific rebuilt its large Wilburton trestle near Seattle, Wash., a 66-span structure, 984 ft. long, it set up conditions for an interesting comparison of the service life of two different types of construction and also of two types of wood preservation. About half of the structure was constructed during the summer and fall of 1943, with frame bents of pre-framed timber treated with Wolman salts, and the



Looking North Along the Trestle, Showing the Wolmanized Portion in Background and the Creosoted Section in Foreground

Trestle Has Frame and Pile Bents

and Two Types of Treatment

other half was built early in the following year with creosoted pile bents. Most of the bents are unusually high, those in the north half, where the frame bents were used, having an average height of 68 ft. and a maximum height of 98 ft. to top of tie, and those in the south half, where long piles were driven, having an average height of 70 ft. and a maximum of 89 ft. Of its total length, 479 ft., or 32 spans, is of the frame construction, while the remaining 505 ft., or 34 bents, is of the pile construction.

The new structure carries a single track, and replaces a six-post frame bent trestle, also single track, on a detour belt line extending around the east side of Seattle over what is called Mercer slough. This line is known as the Lake Washington Belt Line, and extends from a junction with the main line south of Seattle to another north of the city, bypassing completely the urban district.

The history of the structure reveals that it was originally a frame trestle on pile footings, built in 1904. The frame bents, of untreated material, were replaced completely in 1913, 1924, 1933, and 1943-44—giving an average service life of 10 years. The footing piles, on the other hand, were redriven in 1903 and 1924, and were patched since 1931, to be redriven again in the most recent renewal during 1943-44, giving a weighted average service life of 12 years.

The structure first appeared on the work sheet for its latest renewal in 1941, when it showed evidence of decay, divided about equally between the piles and framing timbers. Serious consideration had been given beforehand to filling the opening, but the idea was abandoned owing to the instability of the marshy ground, the unstable material extending downward as much as 20 ft. It was then proposed to redrive the foundation piles and to renew the frame bents, using creosoted material throughout, doing half the work in 1942 and the remainder in 1943. However, because available creosoting plants were overloaded with work at that time, it was impossible to secure the necessary material.

It was not until the early part of 1943, therefore, that there was any assurance of obtaining delivery of creosoted material, and then of only enough for the short foundation piles for driving half of the trestle. It was learned, however, that timber treated with Wolman salts could be obtained, so it was decided to go ahead with the work on half of the structure, using the necessary short creosoted foundation piles and Wolman treated timber for the posts, sills, struts and braces, and following up early the next year with the renewal of the remaining half of the bridge with creosoted material, if available. The existing ties were 8 in. by 8 in. by 10 ft., and the stringers 9 in. by 18 in. by 30 ft. The latter were placed three per chord, and were in such sound condition over the entire

structure that they did not require replacement.

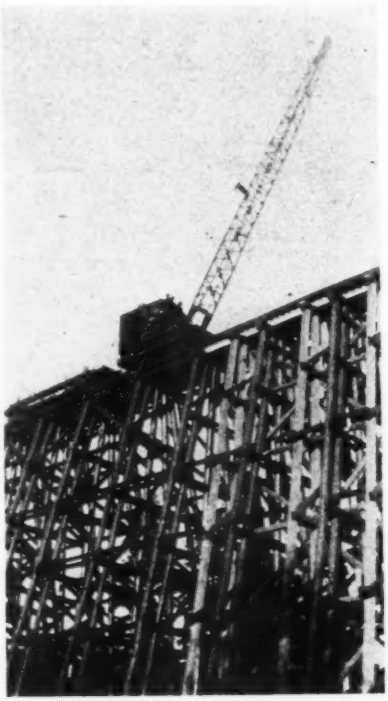
The loading of the new structure is limited to Cooper's E-60 because of the three-stringer chord constructed under each rail, but the frame bents and the pile-bent structure were built for Cooper's E-65 loading. Also, because the trestle was subject to strong winds, which tended to loosen it up, it was planned to use six posts again for the higher bents and to place them with a wide spread at their bottoms for additional stability. The exception to this was the three bents at the north end, which were not over 20 ft. high, where it was decided to drive piles in accordance with the road's standard for five-pile bents.

As built, the frame bents are made up of multiple sections, each about 24 ft. high. Each of these sections is surmounted by a 12-in. by 12-in. intermediate sill, except the top of the upper 24-ft. section, where 12-in. by 16-in. by 14-ft. caps are used and covered with a galvanized iron cap sheet. Each 24-ft. section is cross-braced at its mid-section by means of two horizontal 3-in. by 10-in. planks, and the two panels thus formed are braced diagonally with planks of the same size. The pattern of diagonal bracing includes two planks each for the upper two panels, and four planks each for the next five lower panels, except that in the bottom panel in each case six planks are used. The framed timbers rest on a sill supported by eight piles, which are spaced one under each of the intermediate posts, but with two on three-foot centers under the outer posts. All bottom sills are of 12-in. by 14-in. fir and those over 36 ft. in length are spliced at their centers.

The six posts of each bent are 12-in. by 12-in. fir timbers, spaced on 2-ft. 6-in. centers under the cap. Batter of the two outside posts is about 2½ in. in 12 in., that of the two center posts ½ in. in 12 in., and of the two intermediate posts 1½ in. in 12 in.

The bents are tied together longitudinally with 6-in. by 10-in. horizontal and diagonal bracing timbers, which connect the second and fourth posts of each bent with the corresponding posts in the adjacent bents. The horizontal members of the longitudinal bracing are at the bottom and middle of each 24-ft. bent section, while the diagonal members are connected at the same panel points. Both diagonals in each panel run in the same direction which alternates with each panel and story.

The foundation piles for the frame bents were all driven from the top of the trestle by a steam hammer operating in swinging leads. The leads, 30 ft. long, were suspended by a cable from the boom of a locomotive crane and were held in the proper driving position with wire rope guys.



After Their Longitudinal Braces Had Been Cut Away, the Old Bents Were Quickly Pulled Out by a Locomotive Crane

The new lines of piles were driven about five feet from the old bents.

While the foundation piles were being driven and the sills attached to them with drift bolts, material was being assembled for the bents at a temporary framing yard established about 500 ft. north of the bridge. There the material was received already cut to size, prebored and treated, and was assembled into the 24-ft. bent sections. Each section was completed before it left this yard, even to the setting of the dowel pin in the base of each post and the boring of matching holes in the tops of the intermediate sills of adjoining sections—posing a problem that called for exacting measurements to insure the proper fit at the time of erection. Bolts were used for all primary connections and boat spikes for all secondary connections.

When all the sections for an entire bent had been assembled, they were picked up by a crane, one at a time, in their proper sequence, and were carried to their respective locations. At each specific location where a new bent was being installed, the longitudinal braces of the old bents were then cut away and the new sections were set in place and temporarily braced. When the new bents had been completely erected, the stringers and ties were shifted and the old bent being replaced was cut away from all its connections to the structure and pulled out by the crane. The new bent was then permanently braced longitudinally and the erection work proceeded in a similar manner at the next bent.

There was some concern over the amount of shrinkage that would take place in the timber of the new structure, especially in the four sills of the higher bents. It was estimated that the shrinkage in the sills would be from three to five per cent, which would amount to a total of as much as 1½ in. for the four sills. Accordingly, it was decided to build the new bents ¾ in. high, recognizing that this would eventually leave the deck ¾ in. low, but confident that this could be overcome satisfactorily by means of shimming.

Through the working arrangement followed on this project, power tools could be used to advantage in the framing yard; the new bents could be erected quicker than if built in place, one member at a time; and the old bents could be removed with dispatch—all of which aided considerably in speeding up the work. Also, a derrick car assisted in the lowering of the bottom sills and the longitudinal braces. Ordinarily, two new bents were erected and two old bents removed each working day between the hours of 10 a.m. and 6 p.m.

The Pile-Bent Half

Early in 1944, when it was found that enough creosote-treated material could be secured, plans were prepared for building the remainder of the trestle with creosoted fir piles and lumber.

The bent designed for this portion of the structure consists of six piles, some as long as 110 ft.; cross braces on each side at 12-ft. intervals; two 3-in. by 10-in. diagonal braces per panel, except the bottom panels, which have two additional diagonals; and caps of two 8-in. by 16-in. by 14-ft. timbers covered by a galvanized iron cap sheet, the two timbers being preferred because of severe checking which frequently occurs in a single member of this size. In the three upper panels, the cross braces are of 3-in. by 10-in. planks; in the next lower panel they are 4-in. by 10-in. planks; and in the lower panels they are 6-in. by 10-in. timbers. All longitudinal braces be-

tween bents are 6-in. by 10-in. timbers and are applied in the same pattern as used on the frame bents that were erected in the north half of the trestle.

The piles are centered under the caps 1 ft., 3 ft., and 5 ft. 6 in. each way from the center line of the trestle. The two inner piles are on a batter of approximately ¾ in. in 12 in., and the four outer piles are on a batter of 3 in. in 12 in. Most of the piles have a penetration of 8 to 10 ft., although some have a penetration of as much as 20 ft. where the ground is particularly soft.

The stringer chords were spread apart on the entire half of the trestle to permit the driving of the two inner piles, after which the chords were closed again to their normal spacing and the outer piles were driven and then pulled in at their tops. All driving was done with a McKiernan-Terry 9-B-3 steam hammer.

As on the frame-bent portion, all lumber was cut to size and treated before being shipped to the site, and all field-bored holes and cuts were given a brush treatment of creosote before erection. Here also, all major connections were bolted and secondary connections were boat spiked.

Where this portion of the bridge passes over a country road, two seven-pile inclined bents were driven with a spacing of about 38 ft. at the base to permit an unobstructed roadway of the desired width. These bents lean toward each other so that their tops are 15 ft. apart, and about the same distance from adjacent bents. The seven piles of each bent are on two-foot centers under the caps and spread out uniformly downward, the two outer piles being on a batter of 2 in. in 12 in. The bottom longitudinal braces of these bents are so located as to provide a vertical clearance of 14 ft. for highway traffic. Teco connectors were used between the piles and braces of these two bents and the immediately adjacent bents.

Because of the length and generally great height of this trestle, a considerable amount of material was necessary in rebuilding it. In the frame-bent half 330,000 ft.b.m. of timber treated with Wolman salts and 4,077 lin. ft. of creosoted fir piling were used. In the pile-bent half 188,000 ft.b.m. of creosoted timber and 17,800 lin. ft. of piling were used, while in the entire structure, 24,000 lb. of bridge hardware was necessary and a total of 54,000 ft.b.m. of old stringers was shifted longitudinally. Useable timber salvaged from the old structure amounted to 385,000 ft.b.m., which was later treated for use elsewhere as mudsills, bulkhead timbers and turntable pit walls.

All preframing work on the north half was done at the yards of the Wauna Lumber Company, Wauna, Ore. The timber in this half of the trestle was given the standard Wolman treatment, and was erected by the Morrison & Knudson Co., Seattle, Wash. The short foundation piles used in this half, and all of the piles and timber used in the south half, were given the Boulton (boiling under vacuum) process of treatment with a 45-per cent creosote, 55-per cent petroleum oil mixture, and a retention of 12 lb. per cu. ft. Preframing and treating were done at the plant of the West Coast Preserving Company, Seattle. The piling was driven by the Puget Sound Bridge & Dredging Co., Seattle.

The trestle was rebuilt under the general direction of Bernard Blum, chief engineer, of the Northern Pacific, and R. R. Brockway, at the time bridge engineer, and now retired. G. R. Hopkins, now assistant bridge engineer at Seattle, was in charge of erection.

Quite obviously, the relatively short period of time the new trestle has been in service makes a comparison of the two methods of treatment used impossible, and yet it is beyond question that all of the treated material in the new structure will far outlast the untreated material used in the structure previously. Much interest should develop as to the relative desirability of the two types of construction as related to stiffness, rigidity and permanency. With the shrinkage of timber, which should be relatively small due to the seasoning in connection with the treatment, the bolts can be tightened and firm joints maintained.

In the pile structure, the piles have the advantage of continuity, but the attachment of the various braces to the piles is a detail which it is difficult to work out in order to develop the full strength of the brace members.

Two Bents Were Driven at an Incline Over a County Road

Applying Rock Salt to Cure Heaving Track

TO eliminate or control the heaving of track, a number of railroads, working in cooperation with the International Salt Company, Inc., have developed a method that involves the use of rock salt, which is reported to be giving satisfactory results. The principle underlying the use of rock salt for this purpose is that, when placed in the ballast at locations where heaving has occurred in the past, the salt dissolves into a brine which lowers the freezing point of the excess water present, thereby preventing the formation of ice. The practice is to apply the rock salt in the late summer or early fall in order that the brine will have an opportunity to work into the soil before freezing weather sets in. In the following is given a general outline of the practices followed in applying rock salt to the track for this purpose.

Since it is not possible to determine the exact amount of excess water present in the track and the temperature to which it will fall during the winter, it is difficult to estimate the exact amount of rock salt that will be required in every location. However, from a series of test applications a rule has been developed for determining accurately the amount of rock salt needed for particular locations. Briefly, the rule is to apply the rock salt in the same thickness as the thickest shim that it has been necessary to use at the particular location, up to a maximum of three inches. A larger quantity should not be used because too much salt is said to be a detriment. Another point is that the salt should be applied to the location of the hump of the heaved section and not in the area where shims have been installed in former efforts to overcome heaving.

Several Methods Followed

Several methods may be used in applying the rock salt. In one of these the practice is to spread the salt on top of the ballast with just enough cover to prevent it from being washed off, working it into the ballast with tamping bars. Another, known as the bar method, involves the making of conical holes 24 in. deep in the ballast. Usually nine such holes are made in each crib, five between the rails and two outside of each rail. These holes are from four to six inches in diameter at the surface, depending on the amount of rock salt required. The salt is then placed in the holes and covered with a small amount of ballast.

The "Blanket" Scheme

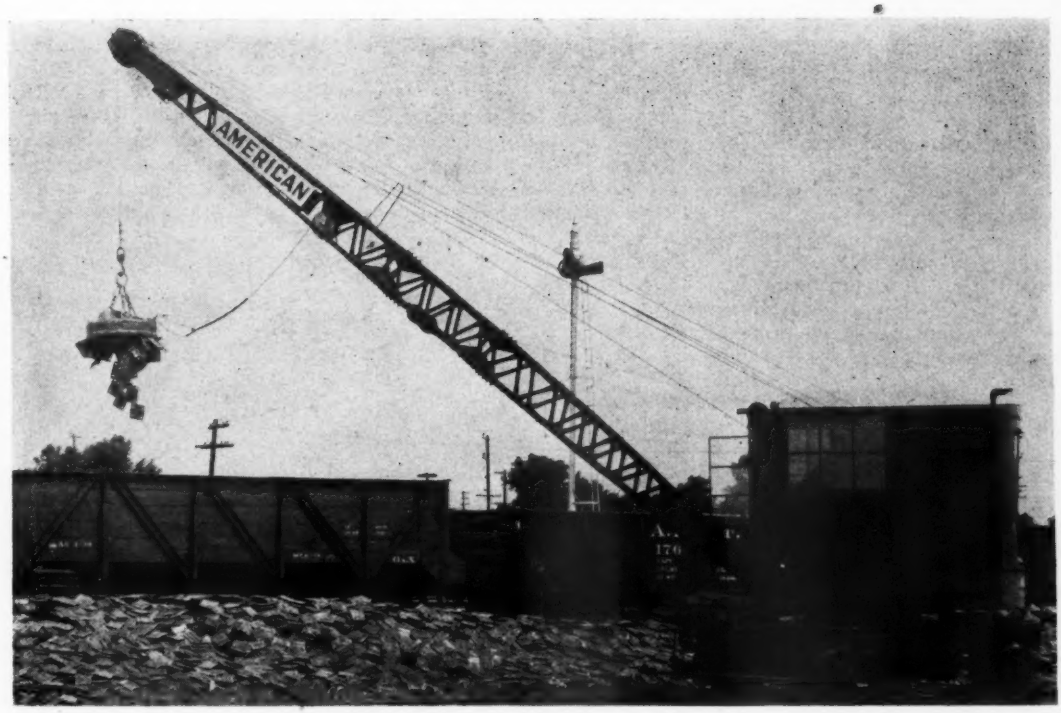
A third method, said to be the most effective of all, involves the removal of the ballast to the bottom of the ties, the placing of the salt and the replacing of the ballast. With this procedure, which is known as the "blanket" method, the amount of labor required is said to be reduced to a minimum and a more uniform distribution of the brine into the roadbed and under the ties is said to be obtained.

As when shimming, it is the practice to apply a run-off when using rock salt. This is done simply by thinning out the salt application toward the ends of the area involved. The length of the run-off is usually governed by the length of the section which has previously required shimming, with the salt run-off being about half as long as that required when the track was shimmed.

Grading with Tractors and Scrapers

Seven International crawler tractors, four equipped with bulldozers and three used for pulling wheel scrapers, were employed to good advantage recently in carrying out a major dirt-moving job on the Chesapeake & Ohio, near Huntington, W. Va. The railroad at that point is located on a high embankment which had to be widened to provide a subgrade for three mile-long supply tracks to serve a coal-washing plant. One 6-yd. and two 10-yd. scrapers, pulled by the tractors, were used to move about 100,000 cu. yd. of dirt from nearby borrow pits to the embankment. One bulldozer was used in the borrow pit to loosen the material, which consisted of river-bottom silt, while three were employed on the embankment to compact and shape the fill.

Right—Loading the Scrapers at the Borrow Pit. Above—Unloading Material and Shaping the Fill at the New Embankment



Handling Used Tie Plates With a Crane Equipped with a Lifting Magnet

Getting the Most Out of Salvage

By A. DRAGER

Maintenance of Way Storekeeper
Central Railroad of New Jersey
Jersey City, N. J.

In this article, which was written originally as an answer to a question which appeared in the What's the Answer department, Mr. Drager shows that through careful attention to salvaging useable items of released track materials, large savings may be realized and that, conversely, lack of attention to their recovery may result in considerable losses. He shows, however, that training, experience and good judgment are required on the part of those handling such materials to assure the largest savings.

THE salvaging of useable track materials is a problem of no small proportions for the maintenance of way forces. When this matter is given careful attention important savings are realized; conversely, if it is neglected economic losses are suffered, which, although indirect, are nevertheless real and may readily run into thousands of dollars. The term salvage as used in this article may be defined as nothing more than the segregation by experienced men of materials removed from the track wherever track maintenance is carried on or rail is laid.

The proper training and experience of the personnel handling the salvage of track materials is of the utmost importance. Otherwise, inefficiency and economic losses may result. The fundamental qualifications needed by those responsible for salvage, in order to be able properly to inspect, grade and classify rail, splice bars, tie plates, frogs and switches, etc., may be stated as follows:

(1) The most important is a thorough knowledge and understanding of rail defects, how they develop and how to identify them. These include transverse fissures, engine burns, crushed heads, vertical split heads, slivers in rail heads, horizontal split heads, shelly rail, split-web rail, piped rail, broken bases, corrugated rails, etc.

(2) Since each piece of track material should be classified and graded according to wear and defects, the next most important qualification is the ability to determine the wear limits on rail, splice bars, tie plates, bolts, spikes, etc.

(3) A thorough knowledge of maintenance of way practices, methods and policies.

(4) A thorough knowledge of the over-all picture as regards the need for track materials is necessary in order to be able to determine where materials removed from main tracks may be used again to best advantage.

In general maintenance work it is the responsibility of the track fore-

man to separate the useable track materials from the scrap. This responsibility is simplified somewhat by the fact that the materials removed in this type of work are usually so damaged, defective or worn as to have no further service life in them. Hence, in most instances they can readily be classified as scrap.

It is when rail is laid that the segregation of track material becomes a task of importance. High-speed heavy-tonnage tracks require first-class materials, and when the materials in these tracks are replaced they generally have considerable service life left in them. To obtain full value from this additional service life such materials must be made to serve further in other tracks of less importance. It is the practice for rail-laying work to be carefully planned in advance. Similarly, the condition of the rail and the amount of the wear present in the rail fittings which are to be taken out of the track should be determined beforehand. Based on these findings it is possible to set up the following classifications: (a) Material suitable for re-use; (b) materials to be reconditioned; (c) materials to be held for emergency; and (d) materials to be sold as scrap. Because of the large amounts of material comprised in these classifications, it is evident that their improper grading by unqualified men could cause considerable economic losses.

Three Methods

In classifying materials according to this grouping there are, fundamentally, three methods that can be used, as follows: (1) Segregating the materials on the job; (2) shipping the materials to a central point for segregating; and (3) segregating certain of the materials on the job and shipping the balance to a central point for classification.

Where the first of these is used the foreman in charge, in order to be able to perform this function satisfactorily, should have the proper education and training, backed by experience, to segregate the materials into useable, non-useable and questionable groupings. Definite methods should be followed in educating such foremen in the principles to be followed in grading materials. This education should include instructions on how to distinguish between useable and non-useable materials. These instructions should be issued in printed form and should be supplemented by practical demonstrations in the field, with the work of the foreman being later subject to field checks by supervisory officers.

The shipping of all materials to a central point for segregating, the second method mentioned above, will bring about the salvaging of the greatest amount of useable materials. However, if the location is too distant from the point where the materials are released, the out-of-pocket cost for the freight charges and the delayed release of cars may make this method uneconomical. The track supervisor and the maintenance of way storekeeper, or others responsible for the proper salvage of materials, should collaborate in determining just when this method is to be followed.

In applying the third method mentioned, it is the responsibility of the foreman to ship the materials that are immediately useable to the points where they are to be installed. The balance is then loaded into cars for shipment to a central point. In loading these materials care should be exercised to the end that the materials to be reconditioned are kept separate from the scrap so the latter can be handled quickly with a magnet.

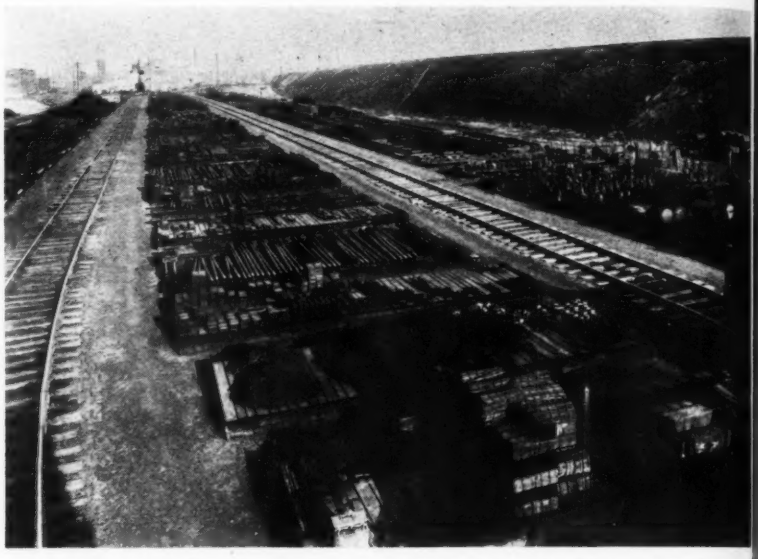
In all these methods an important requirement is that the materials must be handled in an economical manner. In holding the handling costs to a minimum, shipments must be made direct without backhauls and the idle time of cars under load must be as little as possible.

Work-Train Foreman Is Key Man

Since all materials removed from the track must be loaded by a work train, it follows that the work-train foreman is a key man in the salvaging of such materials, for considerable waste can occur if useable materials are loaded with the scrap. A work-train foreman, therefore, should be conscientious and trustworthy, should have practical experience in loading materials, should have a knowledge of the value of materials, and should be thoroughly trained in his work. He should have the ability to judge materials quickly, should know that useable material and scrap should be loaded separately where this is indicated and where the materials are not segregated on the ground he should realize that they are to be forwarded to the material yard for segregation.

All scrap should be loaded into cars for forwarding directly to the steel mills, according to shipping instructions furnished by the maintenance of way storekeeper or whoever else may have this responsibility. The important thing is to see that the loaded cars go forward promptly to the steel mills. To avoid shortage claims the cars should be thoroughly cleaned before loading. Also, care must be taken to insure that other scrap, such as cast iron brake shoes and other car parts, is not mixed with the track scrap. Such scrap must be kept free of rubbish and dirt.

Those responsible for issuing shipping instructions should know in a general way where scrap materials are accumulating. Consequently, if notified a day or two in advance that a car is being loaded with scrap they will then be in a position to furnish shipping instructions the day the car is ready to be shipped. Frequent



Maintenance of Way Material Yard of the Jersey Central at Jersey City, N. J.

checks should be made by the maintenance-of-way storekeeper or others of cars loaded with scrap to ascertain that no useable materials are being included in them.

On certain districts that have only high-speed main tracks, with no sidings or branches, it is apparent that any material removed from these tracks cannot usually be utilized locally. This condition may develop the attitude on such districts that material grading is a waste of time, with the result that all materials are considered non-useable when taken out of the track. In cases of this kind, if it is not possible to have the material graded by competent trained men before loading, then the best policy is to ship all the materials to the maintenance of way yard for sorting and grading. When loading such materials in the field the various items, such as splice bars, tie plates, bolts, etc., should be kept separate, so that each lot may be unloaded economically in the yard by a magnet crane.

The Important Factor

In the salvage of track material the important factor is that no rail or other part which has a reasonable service life left in it should be included in the scrap. The same fundamental policy applies to switch timbers and track ties. The achievement of this end requires the continuous training of the foremen and observation by the supervisory forces in order that maximum results will be obtained. Before any man is advanced to the position of foreman he should be thoroughly trained in grading used track materials and should have demonstrated his qualifications in this regard.

In the matter of material classification, with particular reference to the training of foremen in this work, it should be realized that a man is only as good as the tools furnished him. While most materials can be graded at a glance, there will be doubts about others, and unless the foreman has been furnished the proper tools (training and experience), and has been instructed in how to use them, he will not be able to classify all materials properly. Lacking such knowledge, he may adopt the course of least resistance and place questionable materials in the scrap classification.

Eliminating Weaknesses

Should it be found by the maintenance-of-way storekeeper or others, when checking materials that have been loaded as scrap, that useable materials have been included, steps must be taken to follow the matter through to eliminate recurrences of this kind. In this matter the maintenance-of-way storekeeper acts in the capacity of supervisor of track materials, keeping the road supervisors informed of where weaknesses have developed so they can be corrected.

Maximum results in salvaging track materials will be obtained only by placing responsibility upon the supervisor and his assistants for seeing that each foreman is properly trained and for making frequent checks in the field to ascertain whether instructions are being followed. The track foreman should be held responsible for segregating all useable materials and scrap, while the work-train foreman must be held responsible for making certain that no useable materials are loaded with the scrap. The responsibility of the maintenance-of-way storekeeper should be to make frequent checks of materials shipped out as scrap to ascertain that no useable materials are being included.

The Part of Management

Management also has a part in this problem. It should recognize that neglect of the economic factors involved may result in considerable losses, and should establish the definite policy that all useable materials must be salvaged. In addition, management should also provide the organization to carry out this policy and should support every action which will overcome waste and losses in handling materials.

Furthermore, it should be the function of management to establish educational training courses for all maintenance of way personnel. These courses should cover such subjects as: (1) How to instruct; (2) how to handle a problem; (3) how to improve methods; (4) how to grade track materials; (5) how to apply economic factors in a practical way; and (6) how to extend the service life of track materials.

Finally, management should open the door to the rank and file and encourage the men in its employ to bring to its attention any method, policy, practice or procedure which is better or more economical than the one being followed. If management supports a definite liberal policy in this regard, and at the same time furnishes educational training to the foreman in the salvaging of track materials, the men may be expected to do their best to bring about maximum results, and management will thereby benefit handsomely.

N. & W. Track Awards

The results of the annual track inspection, made in November, 1946, show that the tracks of the Norfolk & Western were maintained in superior condition during the year. Once again, the average system-wide rating for main line and some branch line track shows an improvement as compared with the previous year—the main line rating showing a considerable improvement. Such track scored a rating of 96.6 for 1946, or four points above the 96.2 rating for 1945; Group "B" branch-line track achieved the same rating (94.2) that it won last year; and Group "C" branch lines advanced one point to 93.4.

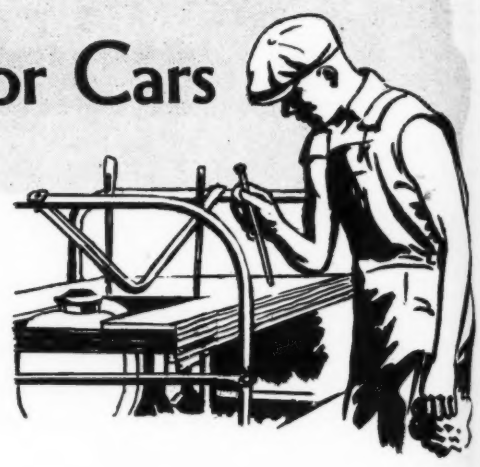
Scores and Prize Winners

The Norfolk division, which won first place in 1944 and 1945, again registered the highest division average, 97.6, an improvement of one point over 1945. The Radford division was once more a close second with a score of 97.4, an improvement of three points over its 1945 score. Two roadmaster's districts were almost tied for first place in the highest district average score. District No. 4 of the Norfolk division won with a rating of 97.8, and district No. 9½ of the Radford division followed closely with a rating of 97.7.

A total of 85 track foremen won prizes for their work. Of these, 27 achieved a rating of 98.0 or higher. They were, in Virginia, L. W. Morris, Disputanta; J. M. Nimmo, Disputanta; W. Pitts, Wakefield; J. R. Jamerson, Prospect; F. L. Garrett, Briery; H. B. Cralle, Evergreen; J. T. Inge, Pamplin; L. C. Gooden, Island; C. M. Tinsley, Jr., Goode; W. B. Tinsley, Thaxton; E. A. Tolley, Forest; D. D. Jenkins, Berryville; R. C. Thompson, Cold Spring; L. G. Fainter, Stuart's Draft; P. D. Faries, Roanoke; A. D. Early, Vicker; S. B. Brumfield, Montgomery; H. W. Greer, Clark; F. P. Combs, Rural Retreat; C. A. Peak, Chilhowie; W. Catron, Crockett; E. E. Williams, Eggleston. In West Virginia the winners were, C. G. Dooley, Ada; C. R. Britt, Saltpetre; and T. B. Thompson, Fort Gay. In Ohio they were, E. S. Detty, Pride, and D. R. Burnett, Otway.

Prize-winning foremen whose 1946 ratings showed the greatest improvement over those of 1945 were: L. E. Palmer, Rushtown, Ohio, whose score was 4.25 points better; Mr. Burnett, whose rating showed an improvement of 3.71 points; and W. Heibel, Bannon, Ohio, whose score was 2.15 points better.

Lubrication of Motor Cars



Part II

By G. R. WESTCOTT
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No. 11 of a Series

This installment of the series on motor cars is the second section of a two-part article on the lubrication of such cars. Part I, which was published in the December issue, was devoted primarily to the problems of lubricating two-cycle engines. The present installment deals particularly with four-cycle engines, and concludes with a list of rules to be observed in lubricating motor cars generally.

THE lubrication of the four-cycle engine is familiar to everyone through the common use of the automobile. Clear gasoline is used for fuel and the lubricating oil is provided separately, being carried in a crankcase reservoir. The lubrication of this type of engine, in its simplest form, was by what was known as the "splash system," in which "splash fingers" or "oil throwers" dipped into the oil at each revolution of the crankshaft and splashed or threw the oil to all surfaces of the crankshaft, connecting rods, and crankcase walls. From these surfaces, the oil would penetrate the bearings and provide lubrication.

The Pressure System

While now generally supplanted by the "pressure system" of lubrication, the splash system had some advantages; there were no oil lines to clog and no pump to maintain; and so long as the oil in the crankcase was kept to the required height and the splash fingers were intact, the crankcase was filled with an oil-laden vapor and all parts received some lubrication. However, with higher engine speeds, the need for more positive lubrication was met by the pressure system.

In the pressure system, the oil is drawn from the reservoir by a pump and forced through oil ducts leading to the main bearings, through the crankshaft to the connecting rod bearings, and in some cases, through the connecting rods to the piston pins. By this means, the oil is applied in the bearings rather than around them; and, escaping through the bearings, is thrown off by the moving parts so that, as in the case of the splash system, the crankcase is well filled with an oil-laden vapor. If the pressure system is carried to the piston pins, the oil escaping at the ends of the pins spreads over the walls of the cylinder and piston; otherwise, the piston walls are lubricated only by the oil that is thrown off from the crankshaft. In any case, no oil reaches the upper part of the cylinder walls above the piston, except that drawn past the piston rings when the upper cylinder is in partial vacuum and a new fuel charge is being drawn in.

The hazards of the pressure system are pump failures and clogged oil lines. In some pressure-lubricated engines, the splash fingers are retained as insurance against complete lubrication failure. A relief valve is provided through which the excess of oil pumped over what the oil ducts will carry, is returned to the reservoir.

The oil for a four-cycle engine should be chosen carefully for both grade and quality. The grade recommended by the engine manufacturer should be used. In motor car engines SAE 30 oil is used most commonly, although a lighter oil may be desirable for winter use. If the engine is worn, there is sometimes a temporary advantage in using an oil one grade heavier, as for example, SAE 40 instead of SAE 30; but it must be remembered that the oil must penetrate the bearings or be forced through the oil ducts, and if these were designed for a lighter oil, the use of a heavy oil may invite trouble.

The oil must be of good quality. It does not ordinarily meet with quite such high temperatures as in a two-cycle engine, nor are its carbon-producing characteristics so important, since, under normal operation, so little of it reaches the combustion chamber. However, it must retain its lubricating qualities at high temperatures, and, in cold climates, its fluidity at low temperatures.

It is, of course, essential that the required amount of oil is in the reservoir at all times. To determine this, a bayonet gage is usually provided, marked to show the maximum height of oil when the reservoir is filled, and also the point below which the oil level should not be permitted to drop. On some engines, two pet cocks are provided to show whether the reservoir is full or needs more oil. If these are used, a small wire should be run through them occasionally to make sure that they are not clogged. The height of the oil in the reservoir should be tested daily, or oftener if the engine is known to be "using oil." Care should be taken when adding oil to avoid putting in too much. Especially in cold weather when the oil does not flow freely, it may cling to the

filler pipe so that, although the gage does not register more than full at the moment, it will do so when all the oil has found its way to the reservoir. Usually the operator can tell from inspection of the gage about how much oil is needed.

Unless the engine is equipped with an oil filter, which is not common on motor-car engines, the reservoir should be drained and refilled at regular intervals. In this, the builders' instructions should be followed. Usually these are that the oil should be renewed after each 40 hrs. of operation. Since neither the mileage of the car nor the actual hours of operation is a matter of record, there is likely to be some uncertainty as to when an oil change is necessary. Under these conditions, it is better to change the oil too soon than to run too long without a change. With a new engine, or one that has been newly overhauled, the first change of oil should not run more than one-half the usual time.

Oil Filters

If an oil filter is provided, the oil ordinarily will be changed only when the filter element is renewed. Failure to do so then will destroy the effectiveness of the new filter element, for it will immediately take up the sludge and filth in the old oil. Some filters are so designed that the elements should be washed out frequently. The builders' instructions should be followed in doing this, and an oil change is not called for when this is done. The need of renewing the filter element depends on so many considerations that no fixed rule can be given. The best guide is usually an examination of the old oil; if it is dark in color and has lost its transparency due to accumulations of sludge, the element should be renewed.

Unless maintained carefully, a filter may damage rather than help an engine. When used, less thought is likely to be given to the oil condition than where there is no filter. Renewing the element, therefore, must be given the greatest care. Its renewal even more frequently than conditions actually require is good assurance that the crankcase oil is in good condition.

The engine should be hot when the oil is changed so that the old oil will flow freely, and the drain plug should be left open long enough to permit as much as possible of the old oil to drain away. While it is desirable to flush out the reservoir occasionally, kerosene should not be used, for any of it that may remain in the oiling system will destroy the lubricating qualities of the new oil. A flushing oil, or SAE 10 engine oil, may be used.

When the oil is changed, the lubricant will largely drain away from all bearing surfaces; therefore, after an oil change, the engine should be idled long enough to permit lubrication to be re-established.

The operator should always know the amount and grade of oil required for a refill and see that his supply is kept clean. The use of a funnel having a 20-mesh screen is desirable to remove any foreign substance that may be present in the oil.

Lubrication of the Car

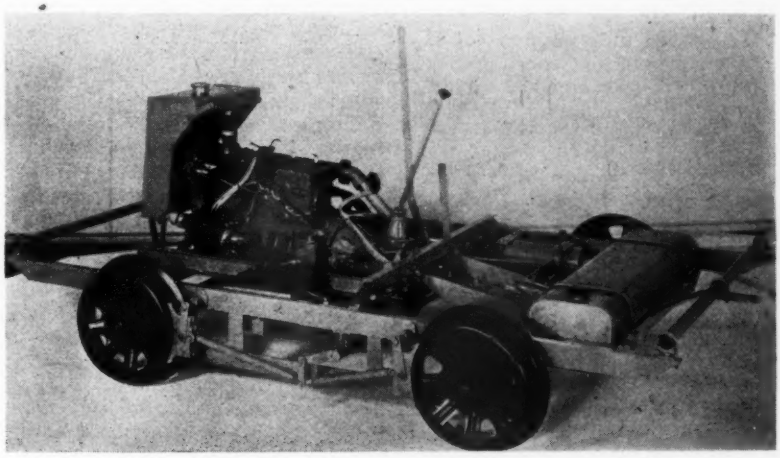
The axle bearings on motor cars were formerly bronze bushings through which the axles turned. For their lubrication, oil holes were usually provided, on the theory that there would always be an oil can on the car from which, from time to time, oil would be poured into the oil hole. Too often the oil hole became clogged; or if a pipe was required to reach from the oil hole to the bearing, the pipe would become clogged or disconnected; or the operator would neglect to use the oil can; or the can might contain black oil for oiling switch plates. For these various reasons, the lubrication was not satisfactory and many bronze bushings and axles were worn out prematurely.

Fortunately this type of axle bearing has disappeared to a large extent, being replaced with roller bearings. But some of the earlier lubrication methods still persist. A continual supply of fresh oil furnishes excellent lubrication for a high-speed roller or ball bearing, but axle bearings operate at a comparatively low speed, and it is difficult to provide a continual supply of oil. For that reason, grease lubrication will generally be found to give the best satisfaction. If the grease used is of a suitable type, it will furnish adequate lubrication, and any leaking out around the grease seal will tend to carry out any foreign substance that may have found its way into the bearing and to assist in preventing the entrance of dirt and grit.

The grease should be selected with care. Desirable characteristics are:

(1) Physical properties permitting its application by a grease gun or through grease cups at ordinary temperatures.

(2) Adequate lubricating properties which are: a viscosity sufficiently high to maintain an unbroken film between bearing surfaces under load, and, at the same time, sufficient oiliness to permit free movement of the rollers at ordinary temperatures.



Modern Motor Cars Have Many Parts that Require Careful Lubrication

(3) Freedom from acid-forming substances that might attack and injure the bearing surfaces.

Cup Greases

While ordinary cup greases have been used largely, they often lack the desirable characteristics. If light enough to flow freely through a gun or cup, they often lack viscosity at slightly higher temperatures and leak past the grease seals or fail to lubricate. Conversely, if they are heavy enough to avoid undue leakage at higher temperatures, they may not flow freely in a gun or cup when cold, or may be so stiff in the bearing that the rollers will cut a channel through them and lubrication will fail. Also, being cheaply manufactured, such greases are more likely to contain injurious elements than greases of better quality. There are many greases available that will give much better satisfaction in axle bearings than either oil or cup grease. While the cost of such greases is somewhat higher than most cup greases, their use will pay good dividends.

Many railroads use grease guns for axle lubrication, others prefer grease cups, believing that the use of guns will prove expensive through the loss of the guns and the frequent need to replace them. Adequate lubrication can be secured with either.

Generally, complete packing of any roller or ball bearing with grease defeats the purpose of the lubrication to some extent, for it tends to impede the movement of the rollers or balls. This is true especially if there is any tendency for the bearing to heat, as the grease will then expand and further impede the movement. On axle bearings, however, this caution is not of great importance for the speed is slow, and the tendency to heating is slight. The first appearance of grease being forced out of the bearing as the gun is used or the cup screwed down should be taken as an indication that the bearing is filled, and no more grease should be applied. Where a grease gun is used, such treatment once in 30 days is sufficient.

Grease Guns and Fittings

Several types of grease guns and fittings are available. The most satisfactory fitting for motor-car use is that formerly known as the Zerk fitting and now called the hydraulic type. The gun need not be of large capacity; one holding 9 oz of grease is amply large. A high-pressure gun is not desirable because of the danger of overfilling.

Grease cups, where used, should always be of the ratchet type, otherwise, the vibration of the car is likely to loosen the cup so that it will back off and be lost. Spring grease cups are not desirable on ball or roller bearings, for they tend to keep the bearings overfilled. Grease cups should be screwed down daily, using only moderate force. If too much force is required, it may indicate that the threads of the cup are crossed, or that the oil duct is clogged. Care should be taken in applying the cup, for the large diameter of the cup and the small pitch of the threads make it easy to cross the threads. The grease duct should be cleaned occasionally to permit free passage of the grease.

Grease-gun or grease-cup lubrication will be found more satisfactory for a loose wheel than oil. If a loose wheel has a plain bearing, more frequent lubrication will be required than for axle bearings or other roller or ball bearings. Grease-gun or cup lubrication is most satisfactory for the joint in a differential axle.

It is important that lubrication fittings be so placed that they are as accessible as possible. For example, axle boxes should be tapped at both ends and the fitting so applied that it can be reached most easily. Regardless of whether an oil cup, a grease cup or a hydraulic fitting is used, the lubrication is likely to be neglected if the fitting is hard to reach.

It is important that the magneto, if used, receive sufficient lubrication, and quite as important that it does not get too much. Instructions accompanying the magneto, as to its lubrication, should be observed carefully. As has already been mentioned, much magneto trouble can be traced to carelessness in oiling.

Lubricating Transmissions

Many modern cars have a selective speed transmission, similar to that in an automobile. The builders' instructions should be followed with regard to the proper grade of grease to be used and the grease should be of good quality. Similar care should be given the directional transmissions used on some cars. Frequent changing of the transmission grease is not required, but it may be necessary to add some occasionally; and a lighter grade will generally be employed in winter than in summer.

The use of open oil holes should be avoided. Except in the engine, the use of oil as a lubricant has been superseded to a large extent by grease. In locations where oil is still used, covered oil cups should be provided. All oil and grease cups and fittings should be kept free from dirt.

On certain of the older types of cars, there are open gears and other exposed surfaces that require some lubrication. The requirements for these will vary somewhat with the conditions under which the car is operated. A non-sticky graphite grease is to be preferred if such surfaces are exposed to much dirt or grit. Accumulations of old grease and dirt should be removed before new grease is applied.

On chain-driven cars the lubrication of the chain is important and its purpose should be understood. It is to save wear between the pins, rollers and links of the chain and not between the chain and the sprockets. Grease will not pentrate the surfaces to be lubricated but will collect dirt and grit on the outside of the chain and on the surfaces of the sprockets. It is thus likely to increase the wear on those parts unless it is of a non-sticky graphite type.

To reach the interior of the chain, engine oil should be used. One motor car builder suggests the following as the ideal method for applying the oil: "Remove the chain from the car and soak it in hot oil. The excess oil can be removed by rattling the chain in a box of clean sawdust and brushing it off." Since the chain should be oiled every 300 miles or perhaps once a month, the more convenient method is to apply the oil to the chain as the car is pushed along the track, and then to wipe all oil from the surfaces of the chain and sprockets carefully to prevent accumulations of abrasive material.

Cleanliness Emphasized

The importance of keeping all lubricants clean and free from foreign substances cannot be emphasized too much. Dirt in the lubricant may defeat the purpose of lubrication in two ways: it may clog the channels through which the lubricant is supposed to reach the bearings, or if it actually reaches the bearing surfaces, it, together with the lubricant, may form a sort of grinding compound leading to scored or burned-out bearings.

Greases should be furnished in small cans, usually of one-pound or five-pound size. They should have tight covers, and the covers should be replaced carefully and securely each time after grease has been taken out. In filling grease guns or cups, a clean wooden paddle should be used. Grease fittings should be wiped clean before the gun is applied.

A separate can should be provided for each type of oil, and used only for that purpose; otherwise trouble may result. For example, if engine oil is placed in a can that previously contained transmission grease, the small amount of the latter remaining in the can may be sufficient to clog the oil lines of a pressure-lubricated engine and cause a complete engine failure.

Compared with the expense that poor lubrication may cause in increased cost of maintenance and in shortening the life of the car, the cost of the lubricants is small. That, however, is no excuse for waste; yet waste of lubricants is very common, and may occur in many ways, some due to ignorance of the requirements, and more due to carelessness. Any lubricant contaminated with either dirt or some other type of lubricant is wasted; or worse, it make expensive repairs necessary. Carelessness in filling cans may result in overflow. Oil may be left in containers, especially during cold weather when it does not flow freely. Containers should be clearly marked to show what they contain, not only to discourage the too-common practice of "pouring a little out on the ground to see what it is," but also to insure the use of an oil suitable for a required purpose.

Good lubrication demands teamwork of a high order. It is not enough

that suitable lubricants of good quality be purchased, and that the operator of the car exercise the greatest care of which he is capable in their application. Storehouse employees must see that the materials furnished are as specified and that contamination by dirt or by lubricants of other types is prevented. The roadmaster or supervisor who makes the requisitions must know what is required and specify clearly in ordering. The field maintainer must be active in instructing the operator in the correct use of the lubricants; and if he sees that those furnished are not giving good results, report the conditions fully to the proper officer. All along the line, it is necessary to overcome the too prevalent thought that "anything will do for the motor car."

Rules for Lubricating Cars

*(54) All bearing surfaces must be adequately lubricated at all times. This means that suitable lubricants must be applied regularly and carefully.

(55) For engine lubrication, use a good quality of oil of correct grade. Follow builders' recommendation as to grade, and determine quality by test.

(56) Where oil is mixed with gasoline for two-cycle engines, use the least amount of oil of the lightest grade that will give adequate lubrication. Be sure that the oil and gasoline are mixed thoroughly before placing in tank.

(57) In four-cycle engines, maintain the correct level of oil in the reservoir. Drain and refill after 40 hrs. of operation, unless a filter is used.

(58) If a filter is used, clean the filter element as recommended by the manufacturer, and renew it when the condition of the oil indicates that the filter is not effective. Change oil when the filter element is changed.

(59) Change oil only when the engine is hot, and drain the crankcase thoroughly. Do not flush it with kerosene. Do not overfill with oil. After changing oil, idle the engine for a few minutes to re-establish lubrication before applying load.

(60) In cold weather, permit the engine to idle slowly until the oil is flowing freely, before running the car. If equipped with a pressure gage, see that the pressure registers normal before running the car.

(61) Oil magnetos regularly but sparingly. Avoid getting oil on parts not requiring lubrication, and especially on points.

(62) Examine all bearings frequently, especially on long runs. If undue heat is noted, find the cause and correct it.

(63) Keep oil and grease cups clean. Wash them out with kerosene occasionally, drying them thoroughly before refilling. Clean ducts leading to bearings with a wire or small brush to remove foreign matter.

(64) Wipe grease fittings clean before applying a gun. Avoid overfilling ball and roller bearings. Do not use more oil or grease than is necessary. Wipe any surplus from exposed surfaces to aid in keeping the car clean.

(65) Use oil on chain rollers and pins, but keep outside of chain and sprockets free from grease.

(66) Keep all lubricants clean and free from dirt or other foreign substances.

(67) Avoid waste of oils and greases. Have each container marked to show its contents, and do not use any container for any other lubricant than that marked.

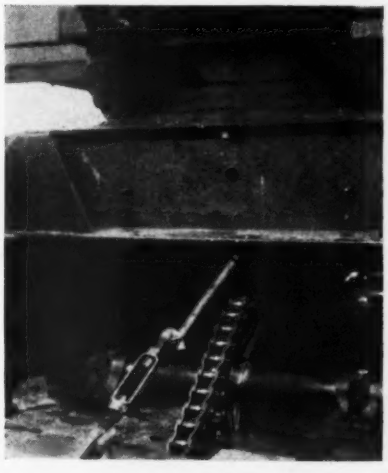
*The numbering of these rules is consecutive with a set of general rules that was included in No. 9 of the series, which was published in the September, 1946, issue, page 943.

A Crawler-Mounted Crane Takes to the Rails

A CONVERTIBLE crawler-locomotive crane, in which the advantages of both types of machines are incorporated in a single unit, was created recently by a contractor through the simple expedient of mounting his Link-Belt Speeder LS-50 crawler crane on a specially-built flanged-wheel carriage, with power for traction purposes on the rails being obtained by installing a drive-chain mechanism to connect the traction shaft of the crane to the drive axle of the carriage.

The convertible unit was devised when the contractor found that he needed a track-mounted crane for carrying out a job involving the taking up of 8½ miles of abandoned line. When in use for this purpose the "locomotive" crane pushed a standard railroad car ahead while removing rails from behind the crane and loading them into the car. It is reported that, with this unit and a force of 17 men, approximately 4,000 ft. of track could be reclaimed in a day. For taking up and loading the ties, culverts, bridge members and other material, the crane was removed from the carriage and operated as a crawler unit. The work of disconnecting and unloading the machine from the carriage required only about 45 min.

Cecil J. Shields of Bellview Heights, Ala., developed the machine.



Right—Close-Up View of the Drive Mechanism By Means of Which Tractive Power Is Transmitted From the Crawler-Crane Engine to One of the Axles of the Track-Mounted Carriage. Below—The Link-Belt LS-50 Crawler Unit Mounted on the Special Carriage for Use as a "Locomotive" Crane

George Boyd Retires

GEORGE E. BOYD, associate editor of *Railway Engineering and Maintenance*, and dean of its editorial staff in point of age and service, retired from active service on January 1 at the age of nearly 73 years. Thus was terminated a career that involved 49 years of active and constructive service to the railway engineering and maintenance field, the first 25 of which were devoted to actual railway work, largely in supervisory and official capacities, while the remainder were spent as an editor and writer.

Mr. Boyd's practical experience included 14 years with the Illinois Central, 7 of them as a roadmaster, and 12 years with the Delaware, Lackawanna & Western, first as superintendent of bridges and buildings and then as division engineer. Being possessed of a prodigious memory, he accumulated during these years of service a vast store of information regarding the practical aspects of designing, building and maintaining railway tracks and structures. In later years, when he had become a member of the staff of this magazine and of the Railway Age, his fund of practical knowledge was to prove an invaluable asset in enhancing his ability to interpret and evaluate current trends and developments.

A fluent writer, Mr. Boyd was one of the most prolific producers of "copy" on the staff. To the readers of *Railway Engineering and Maintenance* he is probably best known for his editorship, during the last 18 years, of the "What's the Answer?" department which, under his guidance, became one of the most widely and intensively read sections of the magazine. Another activity that had long been his special province was the compilation of statistics showing the annual purchases of work equipment by the railroads and the preparation of an article analyzing and interpreting them for publication in the January issue each year. Other figures based on the railroads' work equipment budgets were analyzed by Mr. Boyd in the March issue annually.

Aside from these and other regular assignments, a constant flow of special articles and editorials came from Mr. Boyd's pen. Until recent years, when it has been necessary for him to confine his activities primarily to office work, he traveled widely to obtain material for his articles, and in this way he kept in intimate touch with the latest developments and practices. Because of this and his earlier practical experience, he was a veritable encyclopedia of knowledge on both past and present practices, and was constantly being called on by other members of the staff to answer technical or historical questions.

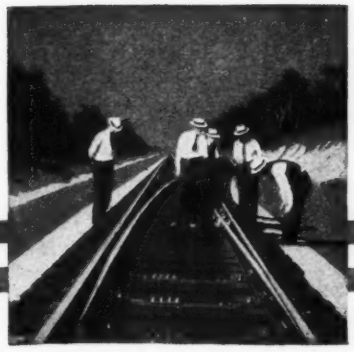
In addition to his strenuous editorial duties, Mr. Boyd somehow found time to serve his chosen field in many other ways. He has been a member of the American Railway Engineering Association since 1908, and has rendered valuable service on several of its committees for many years, including the Committee on Masonry, which he joined in 1913, the Committee on Maintenance of Way Work Equipment, which he joined in 1933, and the Committee on Waterproofing, of which he has been a member since its inception as a special committee in 1931. Mr. Boyd has also been an active member of the American Railway Bridge and Building Association since 1912, and of the Roadmasters' and Maintenance of Way Association since 1923, and in both associations he has contributed generously of his time and knowledge as a frequent member of their technical and standing committees. As if all of these activities were not enough, Mr. Boyd for the last 14 years has edited the annual proceedings of the American Wood Preservers' Association.

George E. Boyd

This account of the highlights of Mr. Boyd's career would not be complete without at least brief reference to those personal attributes that have combined to produce a character of outstanding qualities. A lover of books and an inveterate reader, his range of knowledge extends far beyond his chosen field of endeavor, and embraces at least a working knowledge of most of the sciences and an intimate acquaintanceship with history and politics. Always an industrious worker, he has enriched his life through the satisfaction that comes from having contributed in a substantial way to worth-while causes. A regular churchgoer, his serene outlook toward life and its problems gave him a quality of steadfastness found in few persons and also the strength to endure without complaint a measure of physical pain that long ago would have caused a man of lesser fibre to adopt a life of relative inactivity.

Because he was so well informed in his chosen field, because of his great ability as a writer and editor, and because of his willingness to contribute in any way he could to the advancement of his field, Mr. Boyd will be sorely missed by all those persons and organizations that so long have been heavily dependent on him in performing their duties and functions. This is especially true of the editorial staff of *Railway Engineering and Maintenance*.

Mr. Boyd was born at Roseville, Ill., on February 26, 1874, and was graduated by the University of Illinois in 1896 with the degree of Bachelor of Science in Civil Engineering. He began his long association with the railroads in 1897 when he became a track apprentice on the Illinois Central. In October of the same year he was advanced to rodman and one year later to instrumentman. From April, 1899, to December 1, 1900, he served as resident engineer, and from the latter date until July, 1902, as assistant engineer, maintenance. He was appointed assistant engineer, construction, in July, 1902, and roadmaster in March, 1904. In October, 1911, he entered the service of the Delaware, Lackawanna & Western as superintendent of bridges and buildings, and served in that capacity until April, 1913, when he became division engineer. He was appointed engineering editor of the Railway Review in July, 1923, and when this magazine was purchased in January, 1927, by the Simmons-Boardman Publishing Company (now Corporation), publishers of *Railway Engineering and Maintenance* and Railway Age, he was appointed associate editor of the Railway Engineering & Maintenance Cyclopedia, also a Simmons-Boardman publication. He served in that capacity until September, 1929, when he was advanced to associate editor of *Railway Engineering and Maintenance* and Railway Age.



What's the ANSWER?

Making Switches Last Longer

What can the regular track forces do to extend the life of switches, frogs and crossings?

Their Work Is Decisive

By L. R. LAMPORT
Engineer of Maintenance, Chicago & North Western, Chicago

The useable life of switches, frogs and crossings is dependent on two factors: (1) Proper maintenance; (2) traffic density. Good maintenance is a controlling factor for which the responsibility falls squarely on the shoulders of the regular track forces.

A switch is composed of many working parts which require individual attention. The condition of its foundation—the switch ties—must be watched carefully, and renewals made in time to prevent excessive vertical and lateral movement of the working parts. Switch stands should be carefully adjusted to provide the proper throw of the points and should be firmly spiked or bolted in place. The wearing surfaces of the stand and the switch slide plates should be well lubricated at regular intervals. All bolts in the connecting rod, head rod, clips and heel blocks should be inspected frequently to assure correct tension and eliminate excessive and unnecessary wear. Switch ties should be firmly tamped at all times so as to distribute the load evenly on the switch slide plates through the points and running rails, and thereby forestall anw possibility of the stock rails moving laterally over the risers on the slide plates. Adjustable slide-plate braces should be inspected frequently for good bolt and wedge tension.

The side flow of metal on switch points and stock rails should be watched, and before it has increased to the point where chipping might occur the track welders should be notified to remove it by grinding or other methods. Switch points, rigid switch braces, and many other items of switch construction can be rebuilt to their original contour by welding methods, where such practices are permitted, and thereby enhance the ability of the regular section forces to make adjustments that will result in a tight, yet well-working switch.

Maintenance of bolted frogs and crossings is similar to that of switches. Good ties, accurately spaced, holding the track to good line and surface, are of prime importance. Good surface and sub-surface drainage should be provided and maintained at all crossings, since the impact of the wheels striking the frog results in a relatively short service life for the ballast, even with good drainage conditions. The regular track forces can, by progressive maintenance, keep these drainage systems functioning, and in so doing prolong the life of the crossing.

Close and frequent inspection should be made of bolt tension on all types of frogs and crossings, especially on open-hearth, bolted-rail crossings. There are numerous wearing parts in such crossings and the wear increases by leaps and bounds if bolts are loose. Section forces should ask to have crossing frogs built up by welding when needed to eliminate excessive impact, and the same procedure should be followed on the wings and points of turnout frogs.

As wear develops on bolted-rail crossings, and the filler blocks become worn, the gage and guard-rail spacing will decrease, regardless of bolt tension, and will develop faster if the bolts are permitted to remain loose. This tight gage condition can be corrected by applying new filler blocks

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Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in April

1. *What is the best method of warning track gangs using power tools of the approach of trains? Are there any effective devices which may be used?*

2. *What are the relative merits of plaster and some of the newer materials for the surfacing of the interior walls and ceilings of small stations? Does the size or use of the areas involved make any difference?*

3. *What are some of the effective methods of controlling erosion on new cut slopes or embankments? Should the method be different for cut slopes and embankments? Why?*

4. *What are the practicable methods of underpinning or otherwise stabilizing masonry piers or abutments which show evidence of settlement or undercutting? Does the urgency of the situation or the water conditions involved make any difference in the method selected?*

5. *What is the best method of introducing new power tools and machines on territories where they have not been used previously? Should experienced mechanics or manufacturers' representatives be present?*

6. *What, if anything, can be done to retard or prevent the silting of reservoirs? Where silt has accumulated to such an extent as to reduce the capacity of the reservoir seriously, what can be done to remove it?*

7. *What method or methods, if any, can be employed to prevent tie plates from cutting into the ties? What is their relative effectiveness?*

8. *To what extent can ties and timbers released from bridges be resawed for use in building construction and maintenance? Who should do this salvaging work? What special equipment should be provided?*

or by placing metal shims on the wearing surfaces of the old fillers.

It is apparent, therefore, that the extent of the sound maintenance practices which the track forces apply is the controlling factor in determining the service life of switches, frogs and crossings, and that the important items to watch are: (1) Bolt tension; (2) cross level and line; (3) proper drainage; (4) tie condition and spacing; (5) regular lubrication; and (6) timely repairs by welding processes where they are permitted.

Maintenance Doubles Life

By R. L. Baucom
Engineering Department, Missouri Pacific, Jefferson City, Mo.

Probably no other portion of the track needs to be more closely inspected and correctly maintained than switches, frogs and crossings. Adequate inspection and maintenance by the section forces should more than double their life.

Inspection is the beginning from which the section forces can work to produce a well-maintained switch. Such an inspection should start ahead of the switch points to see that the track gage is correct—then proceeding to check the condition of the switch points; the fit of the points against the stock rails; the throw of the switch; the tightness of the switch clips and bolts; the tension in the switch throw rod; the correct fit of the braces, whether adjustable or not; the easy movement of the points on the slide plates, watching out for any high ties which might cause binding; the tightness of all heel-block bolts; and finally, the condition of the stock rails themselves. All stock rails will form lips as the metal becomes cold-rolled, and it is the duty of the section forces to see that this condition is corrected by grinding, milling or some other method before it has progressed to the point where it might cause the switch points to chip.

Frogs, especially spring frogs, receive severe treatment from passing trains. Section forces should frequently inspect all spring frogs for loose bolts and rivets, correct spring tension, and wear on the point of frog. Guard rails should be checked for distance between the point of the frog and the face of the guard rail.

Effective action by the section forces in keeping the bolts and rivets tight on crossings will do more to lengthen their life than anything else, as it is important to reduce vibration at crossings to a minimum. Receiving traffic from different directions causes crossings to run if they are not prevented from doing so by the application of plenty of rail anchors.

All of the efforts of section forces to lengthen the life of switches, frogs and crossings will fail unless a good bearing is provided. Good ties, kept properly tamped, will prevent poor surface and keep good line and gage, which are the main essentials of effective track maintenance.

By adequate attention to these details and by full anchoring of the track ahead of switches and through turnouts, the regular track forces can extend their life many years.

Good Care Increases Life

By T. M. Pittman
Division Engineer, Illinois Central, Memphis, Tenn.

The life of frogs, switches and crossings depends as much on the care with which they are maintained as on the volume and character of traffic moving over them. They should be kept tight, in good line and surface and have a solid support. These factors are all so important and so dependent on each other that no one of them can be neglected without detriment to the others. The expense of these facilities and their potential hazard to fast train movements, if they are not properly maintained, justifies any effort necessary to keep them in first-class condition.

First of all, they should be carefully and correctly installed. If the roadbed is soft or spongy, it should be stabilized by drainage, pressure grouting or some other appropriate method; then a full section of high-grade clean ballast should be provided. If the timbers or ties are soft or badly cut, they should be replaced and protected with heavy abrasion-resisting plates. The track in all directions should be carefully lined and surfaced and sufficient rail anchors applied.

After installation the unit should be inspected frequently and any loose bolts or other irregularities given immediate attention without waiting for conditions to get bad enough to require general overhauling. The maintenance of these facilities to a high standard by regular track forces will save money in renewals, and perhaps prevent a derailment.

Inspection For Higher Speeds

To what extent have higher train speeds increased the importance of track inspection? The frequency of inspection? What items are most affected?

Switches Most Important

By O. H. Carpenter
General Roadmaster, Union Pacific, Pocatello, Ida.

Track inspection has always been a live subject and is now probably of greater importance than ever before, owing not only to greater train speeds but to heavier equipment and, at the present time, density of traffic as well.

I do not believe that our track structure has progressed as fast as the speeds of trains and the weight of equipment have increased. And in spite of all our efforts in designing and installing track material of greater strength and durability, we are having far more trouble today with failures of rail and its fittings than we had 20 years ago.

The normal wear and tear on rail and fittings seems to me to increase about in proportion to the square of the increase in speed. This makes it more imperative than ever before that frequent inspections be made of tracks. When heavier rail and fastenings were provided, it was thought that less intense inspection would be required, but the conditions mentioned above have outstripped these advantages and make inspection more necessary than ever.

Switches, being the weakest part of our track structure and the one most likely to cause trouble, require the most frequent inspection. Rails, joints and bolts follow closely. During wet weather, when soft spots develop and drainage blocks up, the roadbed and ballast must be closely watched. Surface and alinement must always be closely inspected and corrections made as needed.

It was thought a number of years ago that the gage problem had been conquered. Recently, however, the advent of locomotives with longer wheelbases and tenders with the 4-10 wheel arrangement has made the maintenance of uniform gage as much a problem as anything else on the railway.

Inspection of line and surface irregularities can be made best from trains or motor cars, but to inspect switches, guard rails, etc., one must be on the ground. Inspection from motor cars is not as effective as formerly owing to the increased speed and frequency of trains, requiring that

the inspector's full time be devoted to the operation of the motor car. Under these conditions only cursory inspections are possible, and too much can be overlooked.

It must never be forgotten that inspection in itself does no good unless the adverse conditions found are corrected; and sufficient track forces must be provided so that this can be done without delay. During the depression, and the following labor shortage during the war, our biggest problem was to find the force to correct the conditions found on inspection. Now that train speeds have increased and track maintenance is more important than ever, this problem must be solved.

Inspection Not Increased

By Engineer Maintenance of Way

Higher train speeds, which have been in force on our railroad for quite a few years, have not required more frequent track inspections, but have necessitated more attention to the details of line and surface, to the close adjustment of switches, and to the settings of guard rails. This has been due largely to the fact that before, or soon after, speeds were increased, heavier rail was laid and either C.T.C. or automatic block signal systems were installed. Then, too, our high-speed trains are made up of light-weight equipment, hauled by Diesel-powered locomotives which respond quickly to variations in line and surface but do little damage to the rails that would require increased inspection by section forces.

This does not mean that we have discarded track inspection because of increased rail weight or the use of light-weight equipment, but rather that we have retained our system of inspection instituted before the advent of faster trains, which we believe is still adequate. This system had its birth during the depression years when the track forces became depleted and sections were lengthened somewhat.

At that time we substituted daily motor car patrols, each covering about 70 miles of track, by track supervisors, for the usual method of having the section foreman cover his entire territory each day. This practice was designed to help the section foreman get a full day's work on his section and make the longer section economical. Since train speeds have been increased it has been beneficial in permitting the section gangs to give closer attention to the details required for fast trains and has been entirely adequate for safety. It has meant that every main-track switch has been inspected daily by a track-force employee who is also accompanied once each week by a signal maintainer. Inspection in this manner has been entirely sufficient and has not had to be increased since faster schedules were inaugurated.

We supplement these motor-car inspections with the use of a rail-defect inspection car of the magnetic type, which is run over our main tracks at least once each year and over some sections several times each year. This car detects the invisible flaws our track supervisors would be unable to see and preserves a record of that inspection. Therefore, because of the adequacy of the daily motor-car inspection and periodic rail-testing, both of which we had before speeds were increased, we have not had to change our inspection methods.

Standardize Water Pumps?

To what extent can mumps and other water-service equipment and supplies be standardized? What are the advantages? The disadvantages?

Hard To Accomplish

By J. P. Hanley
Assistant Superintendent of Water Service, Illinois Central, Chicago

Considerable has been written on the subject of standardization, as it is a popular and useful practice. However, in my opinion, complete standardization of water-service items would be difficult to secure.

Some railways have as many as 300 to 400 water stations and the pumping conditions are not similar at all of them. Moreover, in ordering equipment and materials, standardization cannot be carried to the point of using one manufacturer's products exclusively. Such a practice would prevent competitive buying.

There are, however, many items that can be purchased on standard specifications, such as packing, lubricants and general supplies. The railways use many specifications adopted by the A.R.E.A. and, as water-service men draw from their storehouse stock, they are frequently practicing a greater degree of standardization than they realize.

It is advisable to keep standardization practices within reasonable limits; and in ordering pumps and other equipment, the specifications should show the conditions under which the equipment is to operate, such as feet of head, capacity, etc. They may even go so far as to refer to a manufacturer's model to which the ordered item should be "similar" or "equal." Each bidder should be requested to furnish guaranteed efficiency and full information with his proposal. When the proposals are received, the water-service man should recommend the purchase of the item best suited to the conditions. In this selection, standardization should be given full value, along with price, construction details and time of delivery.

On the other hand, there are many items of special tools or equipment which have such outstanding merits that they may be ordered by name and trade mark, perhaps, at even greater cost than competitive, though less merited, lines. Under these and similar conditions standardization is advisable, and should be given due, but not exclusive, consideration in making selections of water-service material and equipment.

Rapid Progress Prohibits

By E. M. Grime
Engineer of Water Service (Retired), Northern Pacific, St. Paul, Minn.

We are living in a world of rapidly changing conditions and those who expect to keep in the forefront of the best engineering practice as far as water-service equipment and supplies are concerned cannot afford to standardize to any great extent. It may be possible to standardize as far as types of equipment are concerned, such as using electric equipment wherever electricity is available instead of steam or Diesel; motor-driven, turbine-type, vertical pumps in place of deep-well, cylinder-plunger types; submersible pumps for wells of considerable depth, etc. But those who may prefer certain types of prime movers, such as gasoline, or semi-Diesel engines, are now frequently compelled to go to more modern equipment because some manufacturers have seen the trend of modern thought and no longer make the original equipment, with some even gradually dropping the manufacture of repair parts. The design of certain types of centrifugal pumps is being improved so rapidly that, even though a pump is not seriously worn, the purchase of a replacement unit can

be justified on the basis of savings through increased efficiency, and the old pump scrapped or relegated to stand-by service only.

We may standardize to some extent on such items as pipe, using in general, cast iron for ordinary underground conditions, cement-asbestos where acid soil conditions are encountered, or flanged steel pipe protected by asphalt coating where serious water hammer cannot be avoided. Changes in design of water columns have not been frequent and if a satisfactory type has been used to a large extent, some saving may be accomplished by a reduction in the volume of repair parts if one or two designs are made standard. However, it may be said in general that water-service design is changing so rapidly that standardization is largely impracticable.

Fill Over Pipe Culverts

What is the minimum fill that should be allowed over a pipe culvert? Why? Does the diameter of the pipe, the kind of pipe or the character of the filling material make any difference?

All Exert An Influence

By T. M. von Sprechen
Chief Engineer Maintenance of Way and Structures, Southern, Charlotte, N. C.

The purpose of the fill material over a culvert pipe is to cushion the shock and distribute the load to prevent excessive stresses in the pipe. The ideal condition would be to give enough cover to absorb all impact and to provide a uniform load on the culvert.

The diameter, kind and strength of the pipe, and the character of the filling material all effect the amount of cover required. The smaller or stronger the pipe, the less cover is required. Also, when the pipe is to be surrounded with the granular types of filling material, such as sandy soils, etc., less of the top-cover material is required.

When we install a 24-in. concrete pipe, we try to place the top of the pipe no closer than three feet from the bottom of ties, while an 84-in. pipe is placed no closer than six feet. In some instances where these clearances could not be obtained, we have successfully installed concrete pipe culverts with less cover than indicated above by using pipe designed for extra strength. However, where culverts from 18 in. to 42 in. in diameter are installed close to the surface of the roadbed, we prefer to use cast-iron pipe. Where we have used corrugated-iron pipe for culverts, we have tried to get at least as much cover for this material as for concrete pipe.

In all pipe-culvert installations it is necessary to insure a full, even bearing of the pipe on the foundation material and to compact the filling material thoroughly around the sides at least half way up on the pipe. Care in the preparation of the foundation and in thorough tamping of the back-fill material is the most important item in installation. This is especially important where pipe culverts are placed with the minimum recommended cover.

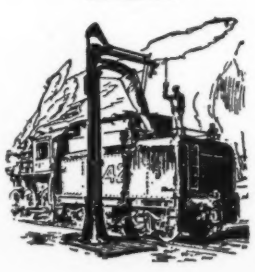
Size and Type Govern

By F. H. Cramer
Bridge Engineer, Chicago, Burlington & Quincy, Chicago

The kind of material from which a culvert pipe is made and its size are the controlling factors in the minimum amount of fill that can be allowed over a pipe culvert. The order in which pipes made of different materials can be laid with the least cover is; (1) cast iron, (2) reinforced concrete, (3) corrugated metal, and (4) vitrified tile.

Cast-iron pipe has such inherent strength that there is little need for special care in securing a cushion of filling material over it. The main consideration in its case is the minimum amount necessary to allow good maintenance of the track for smooth riding.

Reinforced concrete pipe can be laid with almost as little fill as cast iron. For diameters under 24 in., I believe the minimum should be 15 in. and should be increased three inches for each additional foot that the diameter is increased, up to 36 in. for pipes of five feet or over.



Corrugated metal pipe can be placed close under the ties for the smaller pipes, but larger sizes require more fill to prevent impact loads from distorting them. The minimum fill for this pipe should be 15 in. for pipe smaller than 30 in.; 18 in. for 30 and 36-in. pipe; 24 in. for 42, 48 and 54-in. pipe; and 36 in. for other pipe sizes up to 72 in. in diameter.

Vitrified tile pipe should have a cushion of at least three feet between the bottoms of the ties and the top of pipe. Because this class of pipe requires an ample cushion to keep it from breaking under heavy engine loads, it is seldom used except under the least important tracks.

Minimum Depth—Two Feet

By J. P. Dunnagan
Engineer of Bridges, Southern Pacific, San Francisco, Cal.

All the conditions mentioned in this question have an important bearing on the minimum fill to be allowed over a pipe culvert. In addition, the nature of the foundation material is a most important consideration.

The depth of fill between the track and pipe has an important bearing on achieving a uniform distribution of the load over the pipe. On a main line I consider it desirable to have a minimum depth of two feet below the base of tie. As we approach the larger diameters of pipe, the minimum distance below base of tie to top of pipe should be from 1/2 to 1/3 the diameter of the pipe, in order to obtain a uniform distribution of the load. The depth of the cover also has an important bearing on the performance of the joints of pipe culverts, since impact and vibration stresses tend to open culvert joints, unless this action is overcome in the culvert design or by special installation procedure.

Poor foundation conditions can be helped by excavating to a minimum depth of 12 in. and replacing the weak material with a thoroughly compacted gravel bed. Further, where such conditions exist, more cover should be provided than the minimum mentioned above. How much more to provide can be determined only by judgment based on experience.

Probably the most important requirement in culvert installation, and one which should be given greater emphasis when minimum cover is necessary, is that the filling material placed around the culvert barrel must be thoroughly tamped, particularly up to the spring line.

Sand In Gravel Ballast

Where washed gravel is used as ballast, what percentage of sand should be incorporated and what should be the maximum size of the pebbles? Why?

Depends on Gradation

By C. M. Chumley
Engineer Maintenance of Way, Illinois Central, Cricago

On the Illinois Central, washed gravel ballast is used only on lighter traffic lines as it has been our experience that line and surface cannot be economically maintained with it under heavy traffic and high speeds.

Where this type ballast is used, we specify a sand content of 25 to 40 per cent, depending on the gradation of the larger size particles. Our specifications also set 1½ in. as the maximum size permitted for the pebbles.

The purpose of the sand is to add stability to the gravel, as without it, there is a definite tendency for the ballast to roll. The maximum size is determined, in part at least, by the fact that raises made on our lighter-traffic lines are low and we have difficulty with pebbles larger than 1½ in.

Recommends 30 Per Cent

By E. F. Salisbury
Chief Engineer, Kansas City, Southern, Kansas City, Mo.

Washed gravel, when used as ballast, requires the inclusion of coarse, sharp sand as a filler. The purpose of the sand is twofold: (1) It serves as a binder to prevent the gravel pebbles from moving and rolling in the tie bed; and (2) it fills the voids in the gravel aggregate, which otherwise would be open and would quickly fill in with train dust, dirt and other foreign material, resulting in early fouling of the ballast, leading to churning track.

The amount of sand required to stabilize or lock the gravel pebbles depends on the physical characteristics of the pebbles as to size, smoothness and uniformity. Crushed, angular pebbles, will not require as large a volume of filler as will smooth round pebbles which produce a roller-bearing action under the tie.

To obtain the maximum potential service life, from the ballast, and to eliminate early churning, the gravel and the sand filler should be washed free of soil and foreign matter. The materials should be of such hardness that they will resist abraison and disintegration from wheel loads, surfacing of the track, and weathering, each of which otherwise would cause the ballast to be damaged and quickly fouled.

The gravel pebbles should not be so large as to prevent easy and economical work in carrying out necessary light spotting and surfacing of the track. The Kansas City Southern has used washed gravel for ballast for the past 25 years on a large portion of the system. From our experience it has been found that the best results can be obtained with 1½ in. as the maximum size for the pebbles and a sand binder content amounting to 30 per cent.

We have found that it is desirable but almost impossible to get a consistently uniform mixture of the ballast aggregates. When the amount of sand binder is too low, the track will kick out of line and surface. This deficiency can be overcome by unloading additional binder material. Usually 10 to 12 cars to the mile will overcome the original deficiency and produce the desired results.

Slippery Concrete Platforms

What can be done to avoid a slippery finish on concrete platforms? On concrete floors? Are special finishing materials necessary? If so, what?

Broom, Or Add Abrasive

By A. J. Boase
Manager, Structural Bureau, Portland Cement Association, Chicago

Several things can be done to avoid a slippery finish on concrete floors and platforms. In the construction of a new floor, two expedients are in general use: (1) Brooming of the finished surface; or (2) addition of a non-slip aggregate to the concrete.

Brooming or roughening of the surface should be done with a fine-hair brush immediately after final troweling. Since floors or platforms with this type finish are difficult to clean, its use is confined largely to outside work.

For interior floor finishes a non-slip aggregate may be mixed with the concrete or sprinkled on the surface of the wearing course just prior to finishing. The most common aggregates used are carborundum, alundum and emery. More of the aggregate is required when it is mixed with the concrete, but the distribution is more uniform. Approximately ¾ to 1 lb. of non-slip aggregate is required per square foot of floor.

When applied only to the surface, from ¼ to ½ lb. of abrasive is used per square foot. The aggregate should be scattered uniformly over the unhardened concrete just prior to compacting, and then worked into the surface during finishing. After the floor has hardened, the surfaces may be ground or scrubbed with floor scrubbing machines using pads of steel wool. This exposes the non-slip aggregate.

For concrete floors and platforms already in service, care should be taken to keep the surfaces clean, thus preventing the accumulation of dirt and grime, which tends to make them slippery. In case this condition already exists, or where the concrete finish is slick, the surface can be cleaned and roughened by etching it with acid. First the floor should be wetted with water and the surface broomed with a 20-per cent solution of muriatic acid until the slickness is removed. Following this the floor or platform should be flushed again with water.

Use Longitudinal Float

By L. G. Byrd
Supervisor Bridges & Buildings, Missouri Pacific, Poplar Bluff, Mo.

Too many failures have occurred in concrete platforms and floors owing to the presence of excessive water in the mix. Concrete used for such purposes should be thoroughly compacted, but not to the point of bringing water or an excessive amount of mortar to the surface. If the water in the concrete separates from the mix, there is tendency toward the formation of a top layer having a high ratio of water to cement. Such a layer is structurally weak and subject to a large amount of shrinkage.

Correct curing of concrete is necessary to obtain high strength, water tightness and resistance to wear. If fresh concrete is troweled too much, the fine materials are drawn to the top, forming a surface that lacks durability. It is never good practice to

sprinkle dry cement or a mixture of cement and fine aggregate on concrete to take up excess surface water. Such fine material forms a layer on the surface that is likely to dust or hair check when the concrete hardens. Coarse aggregate used should vary from ¼ in. to 1 in. in size.

An accurate measurement of all materials, including water, is necessary to insure uniform batches of concrete of good quality. In batch-type mixers, mixing should continue for at least one minute after all materials are placed in the drum. If every piece of aggregate is coated with cement paste, the concrete is well mixed.

To avoid a slippery finish on concrete for floors, platforms and walkways it is necessary to have a good, workable concrete that can be easily floated. The float should be made of wood, from 14 to 20 ft. long, depending on the width of slab being placed, and should be operated with its axis parallel to the center line of the pavement. It should be a plank from two to four inches thick and from five to ten inches wide, stiffened by another plank set on its edge on top and provided with handles at each end. It is usually called a longitudinal float and can be handled by two men standing on bridges spanning the pavement. It is laid on the pavement at one edge and pulled to the other with a whipping motion which leaves transverse ridges.

The longitudinal float is a good tool and forms a uniform surface that, at the same time, will not be slippery. Platforms and sidewalks should not be finished with a steel trowel. Belting is sometimes used to give a doughened surface by pulling it across the slab until a uniform grade is formed, but I believe that wood floats are better. Concrete to be placed in walkways and platforms that are on grades should be grooved. Such grooves should be ½ in. wide, ½ in. deep and 3 in. apart, and should be placed the full length of the slab. They can be made by using driveway groovers, operated alongside a straightedge.

Reducing Track Rusting

What can the section forces do to reduce the rate and amount of rusting that occurs on rail and track fastenings?

Section Forces Need Help

By Roadmaster

Corrosion or rusting of rail and track fastenings is too relentless an enemy for section forces to attack alone. They must have technological as well as general-staff help. It is true that they can do much to remove some of the obvious conditions which accelerate rusting, such as pumping joints, accumulation of dirt, cinders or other ballast against the base of rail, and on tie plates, spikes, etc. And without the section forces giving their constant attention to such details, no other attack against the problem as a whole will succeed. However, the ravages of brine drippings, sulphurous gases from steel mills or other industrial plants, cannot be controlled by the section forces alone. The engineering departments of the railroads and the railway supply industry realized this more than 25 years ago, and put in use the first track oiler. This idea has since been further developed until at the present time there are a variety of models being used all over the country, particularly on brine-drip territory.

The advent of other rust inhibitors in the track fastenings field has been just as notable as the development of track oilers, if not more so. Soon after petroleum inhibitors were first used on bridges, their effectiveness against rust was demonstrated, and they were supplied to the track forces on some roads to be brushed on the adjustable braces, bolts and slide plates of switches. These parts had long been victims of corrosion, and both track foremen and signal maintainers welcomed these new products that reduced adjustments and replacements. Their use then spread to the joints beyond the switches; in fact, they are now used on some roads whenever new rail is laid or old bars are replaced.

Then, too, for more than 10 years the section forces have also been aided in their war against rust by plastic compound or cakes, designed to provide protection for the concealed surfaces of bolts and joint bars and rail ends. This packing consists of a preservative compound with an asphaltic base. In cake form, the cakes are slightly larger than the space between the bars and the rail, so that, when they have been applied and the bolts tightened, the material is forced against all of the surfaces which otherwise would not be reached. The section forces have a definite responsibility in the use of this material to see that the joint bolts re frequently tightened after the application so that bolt tension is maintained as the bars seat themselves under traffic.

The corrosion problem has also begun to influence the design and specifications for track fastenings. The galvanizing of some items of track material is, I understand, a practice on at least one railroad. Years ago when labor and materials were more economical than now, such an expedient would never have been attempted. Increased costs of labor and materials certainly warrant the investigation of any material, method, or machine that offers possibilities of reducing the toll taken by rust and corrosion.

Their Role Is Important

By Assistant to Division Engineer

So far as the section forces are concerned, it would seem to be impractical to expect them to assume the responsibility for protecting the rail and fastenings throughout their respective territories from rusting because of brine drippings or similar causes. They can, however, do much toward preventing the rusting of rail and fastenings by keeping them clean and the ballast dressed below the top surfaces of the ties. Permitting dirt, dust and cinders to accumulate around tie plates, rail fastenings and spikes invites rust and corrosion because of the fact that such accumulations retain moisture. Poor drainage is another factor to be considered, and while not wholly under the control of the section forces, they can do much toward improving drainage conditions.

The prevention of rust and corrosion of track fastenings, however, is largely up to the section forces, as maintaining them in good condition is one of their chief responsibilities. Protection from rust is certainly an important part of such maintenance, and while the advantages of oiling angle bars should be obvious, it may be well to mention them in passing, as follows: (1) The wear on the track fastening is decreased; (2) the nuts on oiled bolts turn more easily with

the result that they can be kept tight more readily than if allowed to rust tight; and (3) there is less tendency for snow and ice to accumulate on oiled joints, permitting their inspection more readily during winter months.

The protecting of frogs and switches from rust and corrosion is strictly within the jurisdiction of the section forces, as a mechanical oiler cannot apply the oil or other coating to all the surfaces at such locations that need protection. In establishing a program for protecting frogs and switches from rusting, two or more men should be assigned to the work. The equipment required is the necessary containers for the oil or other protective coating and 5-in. brushes similar to a wall-type brush with long bristles. Swabs and discarded paint brushes are sometimes used, but they are not satisfactory, as swabs are wasteful of oil and old paint brushes are not effective.

Various helps are available for use by the section forces in reducing the rate of rusting of track fastenings. These include large machine oilers to oil both joints and rail, smaller hand oilers, joint packings, etc. But, as important as all of them are, they are not "cure-alls," and their use does not relieve the section forces of their responsibility in protecting the track appurtenances from rust. Experience has shown that any labor spent in doing this will be more than repaid in the saving of labor and in materials.

Small Station Foundations

What are the relative merits of creosoted pile heads and small concrete piers when used as foundations for small frame stations? Sections cut from second-hand creosoted piles? What precautions should be observed?

Uses Creosoted Pile Heads

By L. G. Byrd
Supervisor Bridges & Buildings, Missouri Pacific, Poplar Bluff, Mo.

Many small frame buildings are used for various purposes on nearly every railroad in this country. The construction and maintenance costs of the piers and foundations are large, and anything that can be done to lower that cost should receive preferred attention.

Where creosoted piles are driven in trestle bridges and foundations, there is always a large number of pieces cut from the small ends, or taken from the cut-offs at bents, in lengths that vary from 18 in. to 6 ft. We take as much interest in saving these pile heads and cut-offs as we do in saving any other good second-hand material.

We have a variety of frame buildings, such as dwellings for trackmen, tool houses, station buildings and platforms, under which we have placed piers made from creosote pile heads and supported by footing blocks which were saved from the center cuts of treated ties removed from bridges, but which were not suitable for use in other bridges. The ends of the pile heads are protected by an application of hot creosote and a hot layer of coal-tar pitch. A layer of felt paper that has been boiled in creosote covers the pile head. When protected in this manner, termites will not enter the untreated portions of the pile ends.

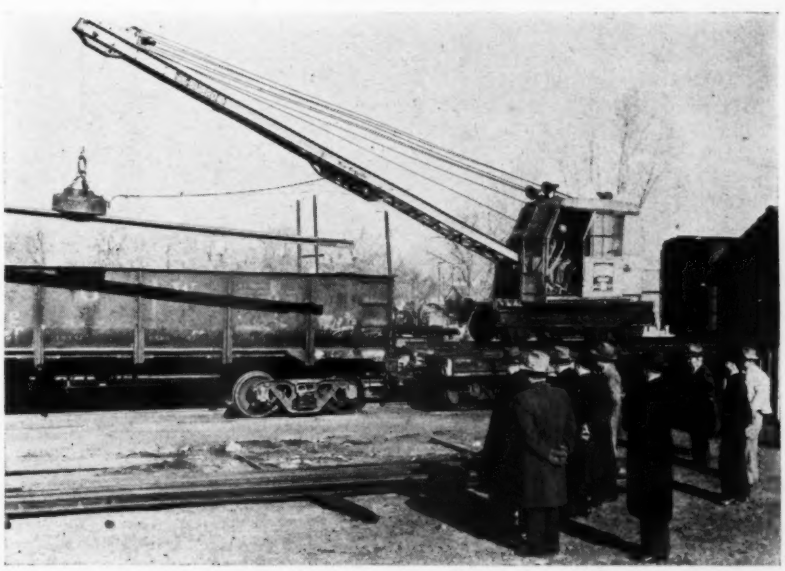
There are three advantages in the use of creosoted pile heads or ends: (1) There is no material cost; (2) they can be applied with smaller labor costs than concrete; and (3) if the building is of such a height as to require stiffening, braces can be applied at a lower cost than if concrete piers had been used and nailing strips had been placed in them, to which the underpinning can be anchored.

Prefers Concrete

By V. E. Engman
Chief Carpenter, Chicago, Milwaukee, St. Paul & Pacific, Savanna, Ill.

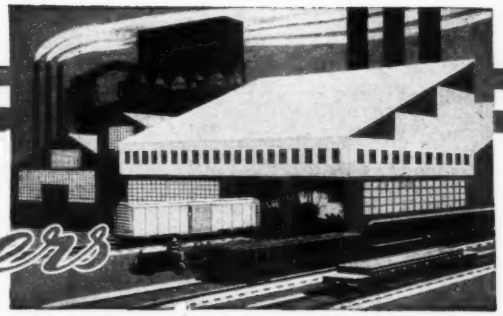
In constructing a new small station where the ground line is near the same elevation as the track, modern practice would lictate a solid-concrete foundation for economy, appearance and permanency. Furthermore, it is fireproof. Where a station building is to be located on ground considerably lower than the track, a solid-concrete foundation would be too costly. In such cases, small concrete piers would be preferable to creosote wood and would have the same general advantages as solid concrete. If the ground is unstable and subject to settlement, there would be justification for wood bents, in that such construction would lend itself readily to re-adjustment.

There may be a tendency to use creosoted pile heads and second-hand creosoted piles in places where they should not be used, merely because we have this material on hand and try to find uses for it. Such material can be used economically to good advantage for repairs to foundations of old buildings and for many other purposes. In using creosoted pile heads or second-hand piles, the only precautions to be observed are the same as for new creosoted timber, namely, care in handling so as not to bruise the outside shell deep enough to puncture the creosoted portion, and the application of creosote to all exposed surfaces.



Loading used rail on the Denver & Rio Grande Western with a lifting magnet handled by a Burro crane. Mounted on a flat car, the crane forms an important part of a supply train that operates periodically over all the standard-gage lines of this company. The crane is also used for picking up scrap, for unloading heavy objects and for material-handling work generally

PRODUCTS of Manufacturers



(For additional information on any of the products described in these columns, use postcards, page 125)

Schramm Tie Tamper

A NEW tie tamping tool, known as Model TT-35, has been added to the line of pneumatic tools manufactured by Schramm, Inc., West Chester, Pa. The new tamper, which, together with the tamping bar, weighs 42 lb., is designed for operation at gage pressures of 70 to 80 p.s.i. Recommended for use with ¾-in. hose, the TT-35 is said to be well balanced and embodies a coordinated valve-timing action which is reported to result in easy operation. All parts of the new tamper are of special-analysis steel, each part being heat-treated for its particular function. The over-all length of this new tamping tool, with the tamping bar inserted, is 44 in.

The Schramm TT-35 Tie Tamper

Model D Tournapull

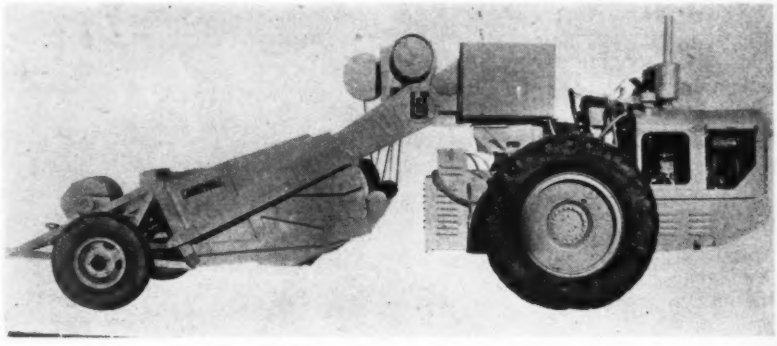
IDENTIFIED as the Model D, a new, small-capacity, high-speed Tournapull grading unit has been developed by R. G. Le Tourneau, Inc., Peoria, Ill. This unit, with a struck capacity 3.3 cu. yd., is designed especially for off-track maintenance and for utilization as a one-man dirt-mover. Power by an 85-hp. gasoline engine, the unit is equipped with the new E-4 Carryall scraper which has a load limit of four tons. The Model D is self-loading, has four speeds both forward and in reverse, and is said to be capable of speeds ranging up to 23 m.p.h.

It employs electric control by individual motors—an operating principle which replaces conventional tractor steering and gear shift levers, and which is said to eliminate the necessity for a power control unit for scraper operation. The operator steers, shifts and handles all scraper controls by means of buttons on an electric control panel. As an additional feature, this model has a new-type differential that is claimed to keep both wheels pulling all times and to be so designed that, under slippery conditions, the most power is supplied to the wheel that has the firmest footing.

The unit is air-brake equipped for safe operation, and greater mobility is said to be provided through positive steering, a development that is said to enable the operator to lock the Tournapull and Carryall into a single unit.

The Model D is said to be easily maneuvered, and to be capable of turning in its own length (22 ft. 5 in.) from a full stop. Other overall dimensions of the rig are: height 7 ft. 4 in.; wheelbase 13 ft. 2 in.; width of cutting edge 6 ft., and weight empty 7½ tons. The two-wheel Model D Tournapull prime mover is equipped with size 14.00 by 32 special pneumatic rubber tires which are claimed to give ample flotation in soft materials and to enable the unit to travel over paved surfaces without damage. On the E-4 Carryall scraper, 9.00 by 16 tires are used.

Based on good working conditions, average material, and 60-min. operating efficiency, the Model D is said to be capable of moving 48 yd. of material per hour with a 200-ft. one-way haul, 40 yd. with an 800-ft. haul, 33 yd. with a 1500-ft. haul, 27 yd. with a 2,500-ft. haul, and 18 yd. with a 5,000-ft. haul.



The New Model D Tournapull and Scraper Unit

Improved Spike Driver

THE mechanical spike-driving hammer being produced currently by the Nordberg Manufacturing Company, Milwaukee, Wis., incorporates a number of improvements over the original model of this machine, which was described in the February 1946, issue. This machine, known as the Nordberg Spike Hammer, is a self-contained unit, weighing approximately 600 lb., and consists essentially of a full-revolving frame mounted on a carriage that can be easily rolled along the rail.

The frame is a balanced beam with a revolving mechanical hammer on one end and a 6-hp., single-cylinder, air-cooled engine, which drives the hammer by means of a belt drive, mounted on the opposite end. In operation, the revolving hammer strikes an anvil which, in turn, transmits the blows to the heads of the spikes. For hold-

ing the spikes when starting them a tool is provided consisting of a specially-shaped metal block, with a handle, in which the spikes are placed vertically, one at a time, and are held against a hardened steel guide by a spring. The machine is said to have a capacity for driving 800 spikes an hour.

Driving Spikes With the Improved Nordberg Spike Hammer

The principal changes in the design of the spike hammer have been made in the revolving frame which contains all of the operating parts. This frame is now more compact than that of the earlier model. Other changes include the enclosing of all of the moving parts within metal guards and a general revision of the entire machine to present a smoother appearance. These changes are said to result in increased safety and in greater convenience and ease of operation.

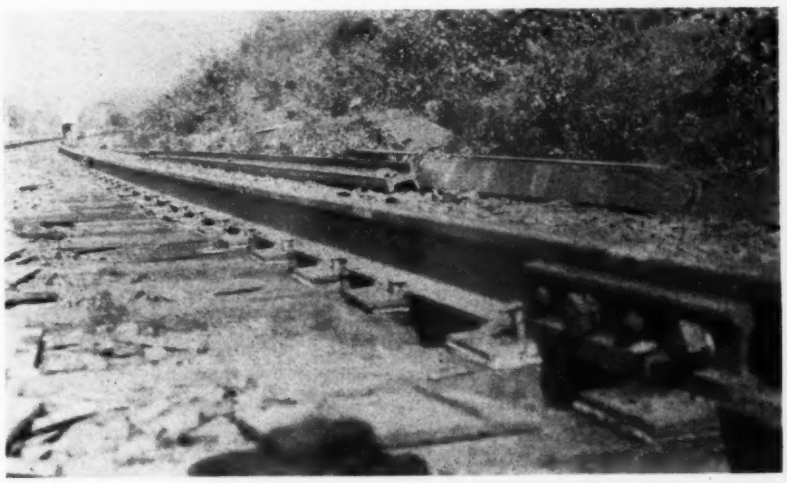
Laminated Tie Pads

A COMPOSITION tie pad, developed by the O'Malley-Dooley Railway Products Company, Boston, Mass., which has been in use on New England railroads to some extent for several years, is now being introduced to the railroad field as a whole. This pad, which in use is inserted between the tie plate and the tie, is constructed of several layers of cotton duck and reinforcing material, stitched with metal or fabric into a compact unit, which is impregnated with asphaltic preservatives and compressed to the specified thickness. It is chemically treated to prevent mildew, powdered to prevent cohesion in shipment, and can be supplied with or without internal reservoirs for retention of surplus cements or preservatives.

The results of 10 years of experimentation and five years of service on high-speed and heavy-tonnage sections of various railroads are said to have been satisfactory. For instance, it is claimed that pads installed in 1939 on the low rail of a four-degree curve on one of the heaviest-tonnage sections of track in New England are still in service with 25 per cent of each pad remaining and the tie plates still above the ties. During the same period of use, adjacent ties, without pads, show plate penetrations of more than ½ in.

The primary advantages claimed for this device are its ability to prevent the mechanical wear of the tie, and the decay of the wood resulting from this wear. Essentially, it provides the means whereby the wear usually occurring to the tie, is transferred to the low-cost, expendable pad. In this manner, it is said, the life of the tie will be increased by six to twelve years, depending on the thickness of the pad used.

It is also claimed that when this pad is applied to a tie on which wear has already occurred, the resinous compounds saturating it are exuded under the pressure of passing trains and forced into the surrounding wood fibres, sealing all cracks and openings. In this manner the use of the pad is said to prevent the entrance of water, sand and other agents which increase abrasion and accelerate decay. Further claims are that the pad provides a cushion which absorbs wheel shocks at joints, thereby reducing batter of the rail ends, and that noise and vibration are reduced generally.



Newly-Laid Rail with the Composition Pads Under the Tie Plates

Improved Trego Switch-Point Guard

THE Morrison Railway Supply Corporation, Buffalo, N. Y., is now offering a new model of the Trego switch-point guard, which incorporates several improvements over the earlier model. In the new design, which is said to function practically in the same manner as a conventional short-length guard rail, the length of the guard has been increased from 15 in. to 36 in. and a means of fastening the guard by spiking to the ties, rather than by bolting it to the stock rail, has been provided.

(For additional information on any of the produc ts described on this page use postcards, page 125)

The improved Trego is of all-welded construction, is fabricated from a standard rail section, and is mounted on two 5/8-in. shouldered steel plates. The plates are spaced on 19-in. centers. The guard is applied inside of the stock rail and opposite the switch point to be protected, with the end of the guard eight inches from the point. The plates are fastened to the two ties immediately ahead of the point by means of 7/8-in. screw spikes, both inside and outside of the stock rail. No additional fastenings are required. The guard may be obtained for any rail section.

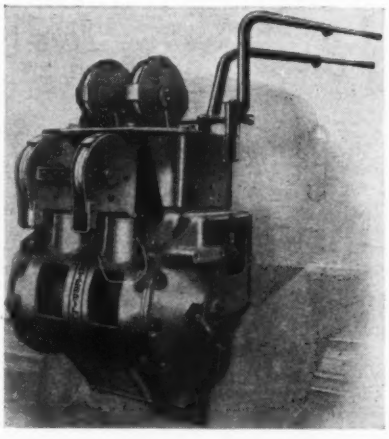
One of the Improved Trego Switch-Point Guards Installed in the Track

Compared with the earlier model the improved Trego provides a longer throat at each end of the guard and a longer flangeway area against which wheels of equipment may bear. These features, it is said, will prevent the wheel flanges from coming in contact with the protected point until they are 12 in. to 15 in. beyond its end.

Rear Cable Control

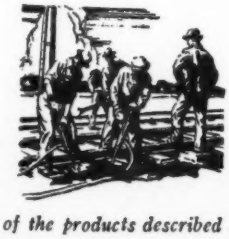
PRODUCTION of a new double-drum rear cable control for use on Models D6 and D7 of its line of Diesel tractors has been announced by the Caterpillar Tractor Company, Peoria, Ill. The new unit, designated the No. 23, is said to be designed to develop the heavy line pulls necessary in the operation of scrapers, bulldozers and rippers.

The new control is of a compact design which permits mounting the unit close to the tractor, thereby minimizing the danger of damage and making it more readily accessible to the operator. The control has a metallic-faced, multiple-disc clutch of the same type as that used for many years on the company's track-type tractors. Synchronization of the brake release and clutch engagement is said to add to the ease of operating the control. Other features of the unit include large brake capacity, anti-friction bearings, a rugged cast-steel case, and provision for a cable reserve of 150 ft. of 1/2-in. cable.



The Caterpillar No. 23 Rear Cable Control

Specifications of the No. 23 control include a 9-in. drum diameter, a sheave diameter of 9 3/4 in.; 564 sq. in. of friction surface for each clutch; an effective brake area of 111 sq. in.; and molded brake linings.



New Book

Maintenance Manual

ROADWAY AND TRACK. By Walter F. Rench. 350 pages. Illustrated. 8 1/4 in. by 5 3/5 in. Bound in cloth. Published by the Simmons-Boardman Publishing Corporation, 30 Church street, New York. Price $5.

THIS is the third edition of this authoritative text on roadway and track maintenance, the first of which appeared in 1921 and the second in 1923. Based on the author's 25 years of service in the maintenance of way department of the Pennsylvania, and an equally long period as an editor and a field representative of the Simmons-Boardman Publishing Corporation, this book provides a wealth of timely information for all maintenance men.

The present edition is considerably larger than its predecessors, having been broadened by the addition of a comprehensive discussion of the proper utilization of mechanical equipment and by the insertion of a number of tables, both within the text and in the closing pages of the book. Further, to increase its value as a practical manual in every respect, much of the original text has been carefully revised and brought up to date.

The book is divided into three parts, the first of which discusses roadway, the second track, and the third a number of special problems and the duties of maintenance officers. Subjects dealt with in the section on roadway include the right of way, drainage, erosion control, roadbed stabilization, the economics of roadway machines, labor-saving methods and devices, and small tools. In the section on track, the author devotes further attention to power machinery and labor saving methods and, in addition, discusses the most effective practices in maintaining main tracks, yards and terminals. Other subjects considered in this section are track obstructions, materials and inspection. The third section of the book is devoted to the economics of track labor, the methods used in solving a number of special problems in maintenance work, and, finally, the duties of supervisory and other employees in the maintenance of way department.

Written primarily for track supervisors, roadmasters and other maintenance officers, Roadway and Track will be especially welcomed by these men. In addition, it will be particularly helpful to those section and extra-gang foremen desiring to acquire a broader knowledge of their work.

(For additional information on any of the products described on this page use postcards, page 125)

Changes in Railway Personnel

General

F. R. Bartles, general manager of the Western district of the Northern Pacific, at Seattle, Wash., and at one time supervisor of bridges and buildings, has retired after 49 years of railroad service. **C. H. Burgess,** division superintendent, at Tacoma, Wash., and an engineer by training and experience, has been appointed assistant general manager at Seattle, succeeding **J. F. Alsip,** who replaces Mr. Bartles.

W. G. Dorwart, division engineer of the Pittsburgh division of the Pennsylvania, at Pittsburgh, Pa., has been advanced to superintendent of the Indianapolis division, with headquarters at Indianapolis, Ind., succeeding **T. E. Boyle,** an engineer by training and experience, who has been appointed superintendent of freight transportation of the Western region, with headquarters at Chicago, where he replaces **Allen J. Greenough,** also an engineer by training and experience, who has been appointed superintendent of the Maryland division, at Baltimore, Md., succeeding **C. J. Henry,** whose appointment as assistant chief engineer of the Eastern region, with headquarters at Philadelphia, Pa., is reported elsewhere in these columns.

C. J. Geyer, whose appointment as assistant vice-president of the Chesapeake & Ohio, with headquarters at Richmond, Va., was reported in the January issue, was born at Zanesville, Ohio, on April

C. J. Geyer

6, 1889, and received his higher education at Marshall College, Huntington, W. Va. He entered railroad service in April, 1908, as a rodman in the construction department of the Chesapeake & Ohio, at Huntington, and became an instrumentman at Cincinnati, Ohio, in November, 1910. From May, 1914, to May, 1918, he served as assistant engineer, maintenance of way department, system, and from the latter date until February, 1924, as division engineer in the same department, at Richmond. Mr. Geyer was appointed assistant superintendent, maintenance of way, in February, 1924, and engineer maintenance of way, on October 8, 1926. On April 16, 1929, he became assistant to the vice-president, and on April 2, 1934, engineer maintenance of way, system. In March, 1943, he was appointed general manager, the position he held at the time of his recent promotion.

Engineering

Robert E. Kennedy, office engineer in the engineering department of the Baltimore & Ohio, has been appointed real estate agent, with headquarters at Baltimore, Md.

Frederick P. Sisson, engineering assistant to the vice-president and general manager of the Grand Trunk Western, at Detroit, Mich., and formerly chief engineer of that road, has retired after 47 years of railroad service.

John P. Datesman, drainage engineer of the Chicago & North Western, at Chicago, has been appointed division engineer, with headquarters at Huron, S.D., succeeding **R. D. Anderson,** who has retired.

Henry T. Roebuck, senior assistant engineer of the Baltimore & Ohio at Baltimore, Md., has been appointed office engineer in the engineering department, succeeding **R. E. Kennedy,** appointed real estate agent, as noted elsewhere in these columns.

H. L. Roblin, division engineer on the Canadian National, at Regina, Sask., has been promoted to district engineer of the Alberta district, with headquarters at Edmonton, Alta. **Thomas W. White,** district engineer at Edmonton, has retired.

Oscar M. Bixby, assistant engineer on the New York Central, at New York, has retired after more than 41 years of service. **Edward C. Hardy,** assistant engineer at New York, has retired after 45 years of service.

W. J. Nuetzel, bridge and building inspector on the Baltimore & Ohio, at Chicago, has been appointed assistant engineer of maintenance and construction, with the same headquarters, succeeding **E. S. Joehnk,** who has resigned to enter private business.

J. Ayer, Jr., assistant signal engineer on the Denver & Rio Grande Western, has been appointed assistant engineer of capital expenditures, with headquarters at Denver, Colo., succeeding **C. D. Johnson,** whose recent death is reported elsewhere in these columns.

R. P. Winton, welding engineer on the Norfolk & Western, at Roanoke, Va., has been appointed testing engineer, maintenance of way, with headquarters as before at Roanoke. **R. M. Baldock** has been appointed welding engineer to succeed Mr. Winton.

V. A. G. Dey has been appointed division engineer, in charge of special duties, on the Bruce division of the Canadian Pacific, with headquarters at Toronto, Ont. **N. B. Roberts,** division engineer on the Trenton division, at Toronto, has been transferred to the Bruce division, where he will be in charge of maintenance.

P. L. Mathewson, research engineer of the Canadian National, at Montreal, Que., has been appointed transportation engineer, with the same headquarters, succeeding **R. A. Black,** who has retired.

J. A. Stocker, consulting engineer on the New York Central, with headquarters at Cleveland, Ohio, has retired after more than 44 years' service. **C. M. McVay** has been appointed consulting engineer at Cleveland to succeed Mr. Stocker.

D. B. McKillop has been promoted to division engineer on the Canadian National, with headquarters at Regina, Sask. Mr. McKillop was born at Carnduff, Sask., in 1903, and was graduated by Queen's University in 1929 with the degree of B. S. in civil engineering. He entered railroad service in 1925, and later became an instrumentman. In 1938 he was advanced to assistant engineer.

J. E. Gault, roadmaster on the Chicago, Indianapolis & Louisville, at Lafayette, Ind., has been appointed assistant chief engineer, with the same headquarters, a newly-created position. **C. M. Bowman,** assistant engineer, at Lafayette, has been appointed assistant engineer maintenance, with headquarters at Bloomington, Ind., a newly-created position. **W. F. Smock,** assistant to the chief engineer, at Lafayette, has been appointed office engineer, with the same headquarters, a newly-created position.

A. T. Hawk, whose retirement as engineer architect of the Chicago, Rock Island & Pacific, with headquarters at Chicago, was reported in the January issue, was born at Aurora, Ill., on November 16, 1875, and received his higher education at Armour Institute of Technology and the Art Institute of Chicago. He entered railroad service in 1900 as a draftsman on the Chicago, Burlington & Quincy, at Aurora, served in that capacity until 1904, when he entered the service of the Chicago, Rock Island & Pacific, at Chicago, as architect. In 1918 he became engineer of buildings, and in 1940 he was advanced to engineer architect, the position he held at the time of his retirement.

C. J. Henry, superintendent of the Maryland division of the Pennsylvania, at Baltimore, Md., has been appointed assistant chief engineer of the Eastern region, with headquarters at Philadelphia, Pa. **T. M. Goodfellow,** division engineer of the Columbus division, with headquarters at Columbus, Ohio, has been transferred to Pittsburgh division, with headquarters at Pittsburgh, Pa., and **L. W. Green,** division engineer, Delmarva division, at Cape Charles, Va., has been transferred to succeed Mr. Goodfellow at Columbus. **George Baylor,** assistant division engineer on the Fort Wayne division, at Fort Wayne, Ind., has been promoted to division engineer on the Delmarva division, succeeding Mr. Green, and **J. F. Piper,** supervisor of track on the Maryland division, with headquarters at Wilmington, Del., has been promoted to assistant division engineer, succeeding Mr. Baylor, at Fort Wayne. **Robert**

Woodcock, assistant division engineer at Harrisburg, Pa., has been appointed assistant to engineer maintenance of way, Eastern Pennsylvania division. **S. M. Rodgers,** former supervisor of track whose temporary assignment to the accounting department at Philadelphia, Pa., was announced in the September, 1946, issue, is serving as assistant division engineer on the Philadelphia division, under that assignment. **G. J. H. Siebert,** assistant supervisor of track on the Williamsport division, has been appointed assistant engineer of water service, with headquarters at Philadelphia.

Mr. Henry was born at Youngsville, Pa., on December 1, 1900, and after attending the public schools of Youngsville, entered the University of Cincinnati, from which he was graduated in 1923 with the degree of civil engineer. Mr. Henry's railroad experience started when he enrolled at the university as a cooperative student in engineering, and during his five years in college he was assigned to work as trackman and carpenter for the Pennsylvania, the service of which he entered on July 8, 1918. He also served as rodman on the Baltimore & Ohio and as rodman and transitman on the Cleveland, Cincinnati, Chicago & St. Louis. Upon being graduated, he re-entered the service of the Pennsylvania in June, 1923, as assistant on engineer corps at Erie, Pa.

C. J. Henry

He then served as an assistant supervisor of track on the Long Island and the Eastern division of the Pennsylvania; and as supervisor of track on the Allegheny, Buffalo, Erie and Ashtabula, Pittsburgh and Philadelphia Terminal divisions. In January, 1934, he was appointed division engineer on special duty at Philadelphia, and in November, 1934, he was transferred to Buffalo as division engineer, serving subsequently in a similar capacity on the Panhandle division at Pittsburgh, Pa., until January, 1942, when he was appointed superintendent at Toledo, Ohio. Mr. Henry was appointed superintendent of freight transportation of the Eastern region at Philadelphia on March 1, 1943, and on January 16, 1945, he became superintendent of the Maryland division.

W. C. Perkins, assistant chief engineer of the Union Pacific, at Omaha, Neb., has been appointed chief engineer, with the same headquarters, succeeding **B. H. Prater,** who has been appointed engineering consultant, at Omaha, a newly-created position. **L. P. Drew,** bridge engineer, becomes engineer of design and construction in the road's engineering department, with headquarters as before at Omaha.

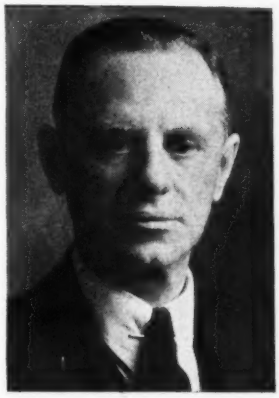
Mr. Perkins was born at Soldier, Idaho, on December 20, 1888, and was graduated by the University of Idaho in 1914 with the degree of B.S. in civil engineering. He entered railroad service on September 21, 1916, with the Oregon Short Line (part of the Union Pacific), and served as draftsman and instrumentman until November 10, 1917, when he enlisted with the Twenty-third Engineers. Released from the armed forces in July, 1919, he returned at once to the Union Pacific, and subsequently served as in-

W. C. Perkins

strumentman, assistant engineer, assistant roadmaster, and roadmaster, until January, 1929, when he was appointed division engineer on the Montana division, and later, on the Utah division. In August, 1931, Mr. Perkins was appointed roadmaster on the Utah division, and in May, 1932, he became division engineer of the Kansas division. From January 1, 1933, to August 10, 1934, he served as roadmaster and general roadmaster on the O.S.L., returning on the latter date to the position of division engineer of the Kansas division. On January 1, 1937, Mr. Perkins was appointed district engineer, with headquarters at Salt Lake City, Utah, and served in that capacity until July 1, 1942, when he was promoted to system maintenance engineer, at Omaha, Neb. On February 1, 1946, he was advanced to assistant chief engineer.

H. W. Flemming, chief engineer of the Grand Trunk Western, a subsidiary of the Canadian National, at Detroit, Mich., has been appointed assistant chief engineer of the Canadion National System, with headquarters at Montreal, Que. **A. N. Laird,** bridge engineer, succeeds Mr. Flemming as chief engineer of the Grand Trunk Western, with headquarters as before at Detroit. **A. T. Powell,** office engineer, at Detroit, has been appointed assistant chief engineer, with the same headquarters. **T. H. Jenkins,** chief draftsman, has been appointed bridge engineer, with headquarters as before at Detroit.

Mr. Flemming was born at Liverpool, N. S., on January 22, 1886, and was graduated from Dalhousie University, Halifax, N. S., in 1909, with the degree of Bachelor of Engineering. He entered railway service in the latter year as a rodman on the Canadian Northern (now Canadian National) on construction between To-



H. W. Flemming

ronto, Ont., and Ottawa, and the following year was promoted to resident engineer on construction of the lines to James Bay. He was transferred to Toronto-Ottawa construction in 1912, and later to construction between Montreal, Que., and Hawkesbury, Ont. He was advanced to inspecting engineer maintenance of the Central region, at Toronto, in 1921, and to division engineer at Hornepayne, Ont., in 1924, transferring to Montreal in 1928. In 1943 he was promoted to district engineer, at North Bay, Ont., and a year later he went to Toronto in the same capacity. In 1945 Mr. Flemming was promoted to engineer maintenance of way at Toronto, and served in that capacity until January, 1946, when he was advanced to chief engineer of the Grand Trunk Western, at

A. N. Laird

Detroit, the position he held at the time of his recent appointment.

Mr. Laird was born at St. Marys, Ont., on March 6, 1892, and was graduated by the University of Michigan with the degree B.C.E. in 1914, and the degree M.S. in C.E. in 1916. He entered railroad service in June, 1911, as a draftsman on the Pere Marquette, at Detroit, and served in other capacities until October, 1914,

when he became a member of the faculty of the University of Michigan. In September, 1916, he became an instructor at the University of Toledo, and in September, 1917, associate professor of civil engineering. Mr. Laird entered the service of the Grand Trunk in 1919, as chief draftsman at Detroit, and was appointed assistant engineer in 1920. In 1929 he was advanced to bridge engineer.

Mr. Powell was born at Athens, Ohio, on August 19, 1893, and received his high-

A. T. Powell

er education at the University of Kansas. After two and a half years of service with the Elgin, Joliet & Eastern as chainman, rodman, and instrumentman, he entered the service of the Grand Trunk Western on September 1, 1916, as a draftsman. He was appointed assistant engineer on January 1, 1920, and engineer accountant on May 21, 1921. On May 1, 1944, he was advanced to office engineer, at Detroit, the position he held at the time of his recent promotion.

C. T. Gunsallus, division engineer on the New York Central, with headquarters at Watertown, N. Y., has been appointed district engineer on the Boston & Albany, with headquarters at Boston, Mass., succeeding **L. G. Morphy,** who has retired after more than 46 years of service.

G. L. Smith, whose promotion to system engineer of track on the Northern Pacific, with headquarters at St. Paul, Minn., was reported in the January issue, was born at Southampton, England, on May 14, 1889, and received his higher education at University College, Southampton, England. He entered railroad service in October, 1910, as a chainman on the Northern Pacific, and served as assistant engineer at various points until 1915, when he became rail and track inspector. In 1918 he was appointed assistant engineer of track, in which capacity he served until 1929, when he was advanced to engineer of track, the position he held at the time of his recent promotion.

J. L. Varker, supervisor of bridges and buildings on the Delaware & Hudson, has been appointed division engineer, with headquarters as before at Carbondale, Pa. Mr. Varker was born at Alden Station, Pa., on April 10, 1895, and entered railroad service in September, 1914, as a timekeeper on the construction of the Wilkes-Barre Connecting, becoming a chainman in July, 1915. Upon the completion of the Wilkes-Barre Connecting, he resigned in February, 1918, to enter the service of the Central of New Jersey as a draftsman, at Wilkes-Barre, Pa. On August 16, 1920, he entered the service of the Delaware & Hudson as a draftsman at Carbondale, Pa., became transitman in 1921, and was promoted to senior transitman in 1924. On September 1, 1927, Mr. Varker was appointed assistant engineer, at Scranton, Pa., during the construction of a grade separation project within the limits of that city, upon the completion of which he returned, on December 1, 1928, to his former position of senior transitman at Carbondale. On April 16, 1930, he was advanced to supervisor of bridges and buildings, with the same headquarters, the position he held at the time of his recent appointment.

H. M. Schudlich, chief chemist in the water service department of the Northern Pacific, at Billings, Mont., has been appointed engineer of water service, with headquarters at St. Paul, Minn., succeeding **E. M. Grime,** who has retired after

E. M. Grime

nearly 40 years of service with the road. **J. L. Goss** has been appointed chief chemist, water service, to succeed Mr. Schudlich.

Mr. Grime was born at Minneapolis, Minn., on July 1, 1876, and was graduated from the University of Minnesota in 1900. He entered railway service on the Chicago Great Western in June of that year and from then until April, 1905, served consecutively as draftsman, instrumentman and assistant engineer on grade revision, bridge work and maintenance. On the latter date he was promoted to division engineer, which position he held until May, 1907, when he became building inspector on the Northern Pacific. He left that road in January, 1908, to serve as an assistant engineer on the Stockyards Terminal railway, where he remained until June, 1908, when he returned to the Northern Pacific as an assistant engineer. He was appointed supervisor bridges and buildings in March, 1909, and in August, 1925, he was advanced to engineer of water service, at St. Paul, which position he held at the time of his retirement.

Arthur W. Carlson, assistant bridge engineer of the Western Pacific, has been appointed bridge engineer, with headquarters at San Francisco, Cal., succeeding **Col. H. M. Smitten,** who has retired after 40 years of railroad service, of which 25 have been with the Western Pacific.

Arthur W. Carlson

Mr. Carlson was born at Anaconda, Mont., on September 2, 1913, and was graduated by Montana State College in 1935 with the degree of B.S. in engineering, and by the University of California in 1940 with the degree M.A. During his college vacations, he worked as a carpenter, and from July, 1935, to October, 1937, he served as a draftsman with private companies and with the National Park Service at Havre, Mont. In December, 1937, Mr. Carlson entered the service of the Western Pacific as a draftsman in the engineering department, at San Francisco, and served in that capacity until 1941, when he was appointed structural draftsman. In September, 1944, he was advanced to assistant bridge engineer, holding this position until his recent promotion.

H. R. Peterson, whose promotion to assistant chief engineer on the Northern

H. R. Peterson

Pacific, with headquarters at St. Paul, Minn., was reported in the January issue, was born at Minneapolis, Minn., on September 5, 1896, and was graduated by the University of Minnesota in 1918 with a B.S. degree in engineering. He entered railroad service in November of the latter year as a draftsman in the engineering department of the Northern

Pacific, resigned on February 7, 1920, to accept private employment, and returned to the Northern Pacific in April, 1920, as a structural draftsman in the bridge department at St. Paul. During 1925 he served as an inspector on bridge construction; from 1926-1927 as resident engineer on new branch line construction at Orofino, Idaho; and, during 1928, as assistant engineer on grade separation projects at Yakima, Wash. From 1929 to 1940 Mr. Peterson served as an assistant engineer in the bridge department, at St. Paul, on grade separation projects and special assignments, except that during 1936 and 1937 he was on special assignment to the Spokane, Portland & Seattle. On October 10, 1940, he was promoted to office engineer at St. Paul, and served in that capacity until April 16, 1944, when he was advanced to principal assistant engineer, with the same headquarters, the position he held at the time of his recent promotion.

Bridge and Building

Wade Mitchell, foreman carpenter on the Eastern division of the Pennsylvania, has been appointed assistant master carpenter on the Maryland division.

C. W. Schlosser, assistant supervisor of track on the Pittsburgh & Lake Erie, at Beaver Falls, Pa., has been appointed acting supervisor of bridges and buildings, with headquarters at Pittsburgh, Pa.

F. J. Leinweber, assistant bridge and building master on the Canadian National, at London, Ont., has been appointed bridge and building master at St. Thomas, Ont., succeeding **G. R. Fisher,** who has been transferred to Stratford, Ont., where he replaces **W. Locke,** who has retired.

M. J. Heary, bridge and building inspector on the Buffalo division of the New York Central, at Buffalo, N. Y., has been appointed assistant supervisor of bridges and buildings, Buffalo division, with headquarters as before at Buffalo, to succeed **C. J. Monan,** who has retired. **J. J. Connors** has been appointed bridge and building inspector to succeed Mr. Heary. **Chester A. Dimick,** foreman on the Boston & Albany, has been promoted to assistant supervisor of bridges and buildings, with headquarters at Worcester, Mass., to succeed **G. N. Hartwell,** who is on a leave of absence due to ill health.

Track

C. Blacklock, roadmaster on the Canadian National, at Port Arthur, Ont., has retired after 44 years' service.

C. T. Koontz, roadmaster on the Chicago, Indianapolis & Louisville, with headquarters at Bedford, Ind., has retired.

G. B. Cox, Jr., has been appointed roadmaster on the Atlantic Coast Line, with headquarters at Sebring, Fla., succeeding **C. A. Hatch,** assigned to other duties.

E. F. Snyder, supervisor of track on the Illinois Centrol, at Bloomington, Ind., has been transferred to Corinth, Miss., to replace **J. M. Woodson,** who has retired after 50 years of service. The position of assistant division engineer at Corinth has been abolished.

W. H. Freeman, bridge and building supervisor on the Chicago Great Western, at Oelwein, Iowa, has been appointed maintenance engineer, with headquarters at Des Moines, Iowa, a newly-created position.

L. E. King, transitman on the Pittsburgh & Lake Erie, has been promoted to assistant supervisor of track, with headquarters at Beaver Falls, Pa., succeeding **C. W. Schlosser,** whose appointment to acting supervisor of bridges and buildings is reported elsewhere in these columns.

V. K. Lowe, assistant roadmaster on the Scioto division of the Norfolk & Western, has been promoted to roadmaster with headquarters at Fort Gay, W. Va., succeeding **Samuel B. Porter,** whose death is reported elsewhere in these columns. **R. Y. Cooke,** assistant roadmaster at Sardinia, Ohio, has been transferred to Fort Gay, replacing Mr. Lowe, and **W. S. Clement,** inspector in the office of the manager of roadway maintenance, has been advanced to assistant roadmaster at Sardinia, succeeding Mr. Cooke.

A. U. Tenney, acting assistant roadmaster on the Atchison, Topeka & Santa Fe, has been appointed roadmaster, with headquarters at Gallup, N. M., succeeding **Earl Delk,** who has been transferred to the Arizona division, with headquarters at Needles, Ariz., where he replaces **R. W. Johnson,** who in turn has been transferred to the Albuquerque division, with headquarters at Prescott, Ariz. **O. D.** Hoge, roadmaster at Prescott, has been transferred to the first district of the Los Angeles division, with headquarters at San Bernardino, Cal., succeeding **R. E. Patton,** who has been transferred to the fourth district of the Los Angeles division, with headquarters at Oceanside, Cal., where he replaces **E. Conway,** deceased.

G. A. Sargent, Jr., supervisor of track on the Buffalo division of the Pennsylvania, at Olean, N. Y., has been transferred to the Pittsburgh division, with headquarters at Cresson, Pa., succeeding **N. L. Fleckenstine,** assigned to other duties. **W. J. Ott,** assistant supervisor of track on the Pittsburgh division, has been promoted to supervisor of track to succeed Mr. Sargent on the Buffalo division, and **V. F. Grubaugh,** assistant supervisor of track, Chicago terminal division, at Colehour, Ill., has been transferred to the Pittsburgh division, at Johnstown, Pa., succeeding Mr. Ott. **D. A. Sempsrott,** assistant on the engineer corps, St. Louis division, at Greenville, Ill., has been promoted to assistant supervisor of track, succeeding Mr. Grubaugh. **A. S. Barr,** supervisor of track on the Columbus division, at Piqua, Ohio, has been transferred to the Maryland division, with headquarters at Wilmington, Del., succeeding **J. F. Piper,** whose promotion to assistant division engineer at Fort Wayne, Ind., is reported elsewhere in these columns. **W. W. Worthington,** supervisor of track on the Panhandle division, has been transferred to the Columbus division, to succeed Mr. Barr, and **W. H. Shoemaker,** assistant supervisor of track, New York division, at New Brunswick, N. J., has been promoted to supervisor of track on the Panhandle division, with headquarters at Wheeling, W. Va., to succeed Mr. Worthington. **G. W. Sturgeon,** assistant supervisor of track on the Philadelphia division at Enola, Pa., has been transferred to the New York division, succeeding Mr. Shoemaker, and **H. T. Alexander,** assistant on the engineer corps, Western region, at Indianapolis, Ind., has been promoted to assistant supervisor of track, succeeding Mr. Sturgeon. **W. E. McCalgon,** assistant supervisor of track at Williamsport, Pa., has been transferred to the Eastern division of the Central region, with headquarters at Alliance, Ohio, and **William Glavin,** assistant on the engineer corps, New York division, at New Brunswick, has been promoted to assistant supervisor of track to succeed Mr. McCalgon. **J. J. Baffa,** assistant on the engineer corps, Columbus division, has been promoted to assistant supervisor of track at Jamesburg, N. J., filling an existing vacancy, and **J. B. Smythe,** draftsman in the general manager's office has been promoted to assistant supervisor of track, with headquarters at Northumberland, Pa. **F. C. Putney,** inspector, maintenance of way, on the Eastern Pennsylvania division, at Harrisburg, Pa., has retired.

Obituary

Samuel B. Porter, roadmaster on the Scioto division of the Norfolk & Western, died on December 2, 1946.

E. E. Milliman, international president of the Brotherhood of Maintenance of Way Employes, died in a Detroit (Mich.) hospital on December 31.

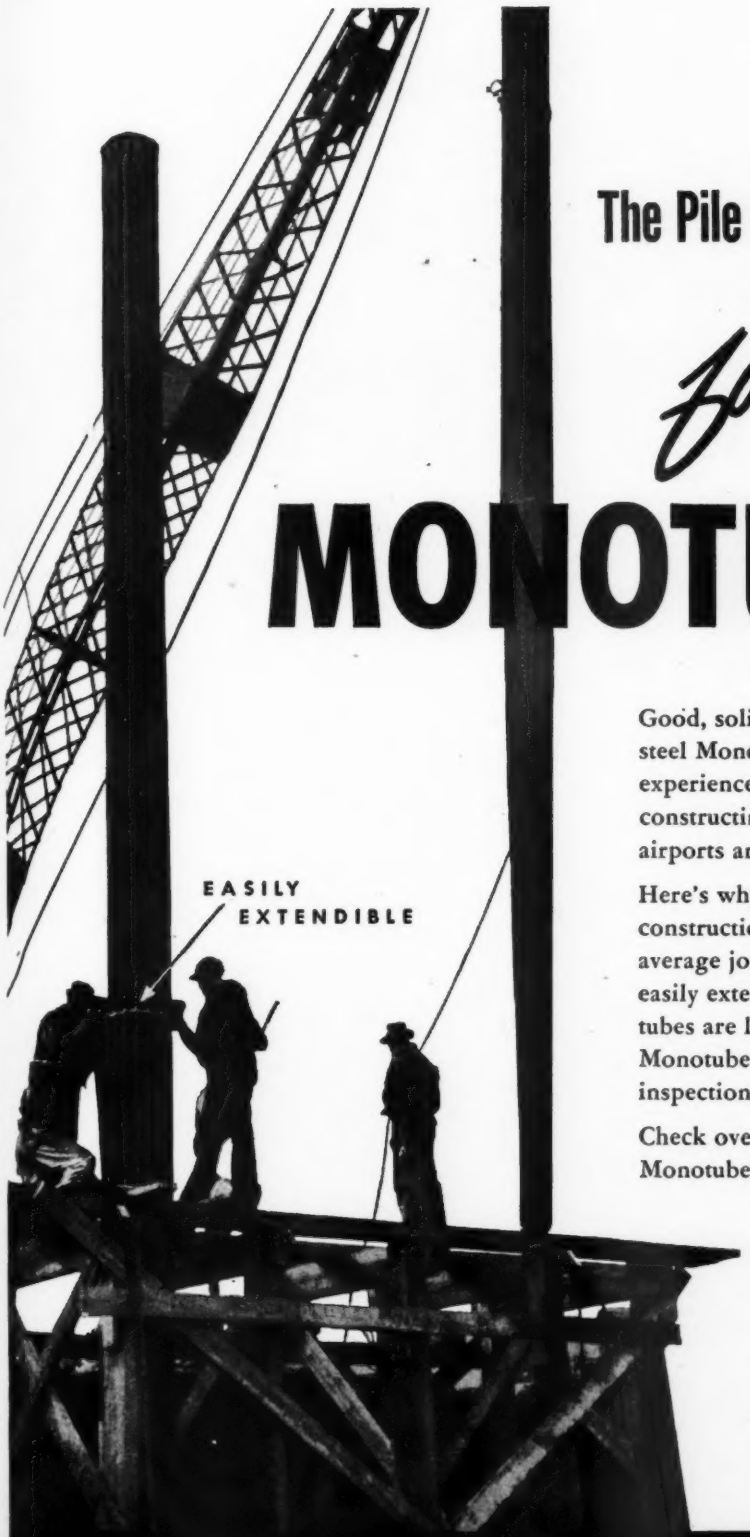
E. A. Zinter, district roadmaster on the Great Northern, with headquarters at Larimore, N. D., was killed in a railroad accident near Crary, N. D., on January 9.

John Wesley Hooks, former division engineer on the Central of Georgia, at Savannah, Ga., who retired in 1927, died at his home in Gordon, Ga., on December 10. He was 86 years old.

C. D. Johnson, assistant engineer of capital expenditures on the Denver & Rio Grande Western, with headquarters at Denver, Colo., died on December 25, 1946. Mr. Johnson entered the service of the D. & R. G. W. in 1908, and served successively as chainman, rodman, instrumentman, assistant engineer, and division engineer until 1941, when he was appointed to the position he held at the time of his death.

H. G. Dalton, structural engineer on the Chicago, Burlington & Quincy, at Chicago, died on January 14, at Wilmette, Ill. Mr. Dalton was born at Aurora, Ill., and he entered the engineering department of the Burlington in December, 1904. In 1918 he was appointed assistant engineer of buildings at Chicago, and in December, 1930, he was promoted to engineer of buildings, with the same headquarters. In 1932 he was advanced to structural engineer.

(*Please turn to page* 168)



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Association News

Metropolitan Maintenance of Way Club

The last meeting of the club, which was held on January 30 in the Skyline room of the Hotel Sheraton, New York, was addressed by L. W. Horning, vice-president, personnel, New York Central System. A second feature of the meeting was a motion picture entitled, The Story of Slab 37.

Roadmasters' Association

All but one of the chairmen of the technical committees for the current year have been appointed, and it is expected that the complete list will be available for publication in the March issue. Cooperating with the American Railway Bridge and Building Association, plans are well in hand for the concurrent annual conventions of the two associations in Chicago, September 16-18.

Wood Preservers' Association

The Executive committee of the American Wood Preservers' Association met in St. Louis on January 17 to further plans for the 43rd Annual Meeting of the association, to be held at the Multnomah Hotel, Portland, Ore., April 22-24, and to conduct necessary routine association business. Among other things, a Transportation committee was set up, looking to arrangements for a special train from Chicago to Portland, possibly with special cars from the South and East to Chicago. A list of the reports to be presented to the convention, together with the chairmen of the various committees involved, appeared in the December issue.

Maintenance of Way Club of Chicago

The next meeting of the club, to be held on February 24, will be addressed by George R. Westcott, assistant engineer, Missouri Pacific, on Maintaining Roadway Equipment. For the third consecutive time the meeting will be held in Harding's Restaurant on the seventh floor in the Fair Store, beginning with a dinner at 6:30 p.m.

The January meeting of the club, with 186 members and guests in attendance, was addressed by T. B. Thompson, special engineer, signal department, Illinois Central, on The Development and Use of Detector Cars, this part of the program being supplemented by a motion picture showing the Oxweld pressure butt-welding of continuous rail on the Bessemer & Lake Erie.

American Railway Engineering Association

With the plans for the 1947 convention nearing completion, most of the standing committees have finished their work for the year, with the result that only one committee met in January and none have scheduled meetings for February. The one meeting held last month was that of the Committee on Masonry, which met at St. Louis, Mo., on January 15 and 16.

The January bulletin (No. 464) was mailed to members late in January. This bulletin contains the reports of the Committees on Wood Bridges and Trestles, Clearances, Iron and Steel Structures, Impact and Bridge Stresses, Records and Accounts, Masonry, and Cooperative Relations With Universities.

The February bulletin (No. 465) will be placed in the mail shortly after the middle of the month. It will contain the reports of the Committees on Roadway and Ballast, Track, and Rail.

The reprinting of the Manual has been completed and copies are now available. Requests for them should be directed to W. S. Lacher, secretary, 59 E. Van Buren street, Chicago 5, Ill.

Bridge & Building Association

The personnel of the eight technical committees to prepare reports for the current year has been selected, and the work of the various committees is already under way. Following is a list of the various committees and their chairmen:

No. 1—Utilization of New Types of Materials in Buildings—B. M. Stephens, arch. engr., T. & N. O., Houston, Tex.

No. 2—Use of Laminated Members in Bridges—Lee Mayfield, res. engr., M. P., Houston, Tex.

No. 3—Unfilled Needs in Power Machines and Power Tools for Bridge and Building Work—R. W. Johnson, asst. engr., C. M. St. P. & P., Chicago.

No. 4—Development and Training of Supervisory Personnel in Bridge, Building and Water Service Forces—F. W. Hutcheson, supvr. b. & b., C. & O., Newport News, Va.

No. 5—Construction and Maintenance of Shop and Enginehouse Floors and Runways—R. W. Gilmore, gen. br. insp., B. & O., Cincinnati, Ohio.

No. 6—Economies Which Can Be Derived Through the Modernization of Obsolete Water Stations—Howard E. Graham, asst. supt. w. s., I. C., Chicago.

No. 7—Safety Measures to Protect Employees Within Buildings Against Fire and Accident—S. L. Chapin, safety supvr., S. P., San Francisco, Cal.

No. 8—Inspection of Substructures and Underwater Foundations—Leo D. Garis, gen. br. insp., C. & N. W., Chicago.

Meetings and Conventions

American Railway Bridge and Building Association—Annual meeting, September 16-18, 1947, Hotel Stevens, Chicago.

American Railway Engineering Association—Annual Meeting, March 18-20, 1947, Palmer House, Chicago.

American Wood-Preservers' Association—Annual meeting, April 22-24, 1947, Multnomah hotel, Portland, Ore.

Bridge and Building Supply Men's Association—Joint exhibit with Track Supply Association, September 15-18, Hotel Stevens, Chicago, during concurrent conventions of American Railway Bridge and Building Association and Roadmasters' Association.

Maintenance of Way Club of Chicago—Next meeting, February 24, Harding's at the Fair, 6:30 p.m.

National Railways Appliances Association—Thirty-second annual exhibit, Coliseum, Chicago, March 17-20, in connection with A.R.E.A. convention.

Railway Tie Association—Annual meeting, September 23-25, 1947, Arlington hotel, Hot Springs, Ark.

Roadmasters' and Maintenance of Way Association of America—Annual meeting, September 16-18, 1947, Hotel Stevens, Chicago.

Track Supply Association—Joint exhibit with Bridge and Building Supply Men's Association, September 15-18, Hotel Stevens, Chicago, during concurrent conventions of Roadmasters' Association and American Railway Bridge and Building Association.

National Railway Appliances Association

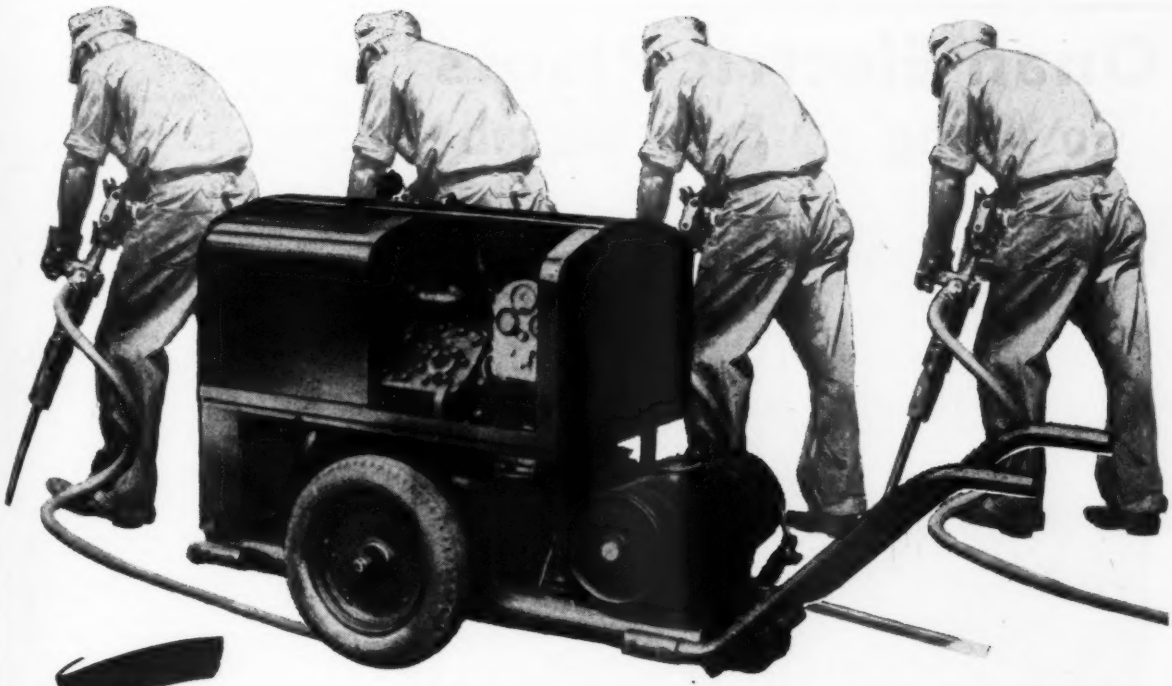
Indications are that the 32nd annual exhibit of the National Railway Appliances Association, to be held in Chicago, March 17-20, in conjunction with the annual convention of the American Railway Engineering Association, will exceed in size and scope any exhibit of the association for the last 25 years. Already, 90 companies have contracted for exhibit space, involving approximately 190 booths, and many companies have still to make definite arrangements.

The exhibit this year will be the first since the restricted exhibit in 1942, and the first large-scale exhibit since 1941. It will be held in the Coliseum, and will be unusual not alone in its size, but also in the number of new companies to participate and the wide range of new products that will be on display for the first time.

Arrangements for the exhibit are being planned and carried out by the officers and directors of the association, headed by W. J. Hanna (Republic Steel Corporation), president, and C. H. White (Industrial Brownhoist Corporation), secretary. Following is a list of the companies which have already arranged to exhibit:

Achuff Railway Supply Company
Air Reduction Sales Company
American Fork & Hoe Co.
American Hoist & Derrick Co.
Armco Drainage & Metal Products, Inc.
Austin-Western Company
Barco Manufacturing Company
Bernuth, Lembcke Company, Inc.
The Buda Company
Caterpillar Tractor Company
Chicago Pneumatic Tool Company
Chipman Chemical Company
Crerar, Adams & Co.
Cullen-Friestedt Company
Dearborn Chemical Company
A. P. de Sanno & Son, Inc.
Henry Disston & Sons, Inc.
The Duff-Norton Manufacturing Company
Eaton Manufacturing Co., Reliance Division
Electric Tamper & Equipment Co.
Fabreeka Products Company
Fairbanks, Morse & Co.
Fairmont Railway Motors, Inc.
General Chemical Company
Hayes Track Appliance Company
Homelite Corporation
Hubbard & Company
Independent Pneumatic Tool Company
Industrial Brownhoist Corporation
Ingersoll-Rand Company
International Harvester Company
Jaeger Machine Company
Johns-Manville Sales Corporation
O. F. Jordan Company
Joyce-Cridland Company
Kershaw Company, Inc.
Koehring Company
The Lehon Company
Le Roi Company
Littleford Bros., Inc.
The Lundie Engineering Company
Maintenance Equipment Company
Mall Tool Company
Marvel Equipment Company
The Master Builders Company
Modern Railroads
Monroe Railway Appliance Company
Morden Frog & Crossing Works
Morrison Railway Supply Company
The Murdock Manufacturing & Supply Co.
National Aluminate Corporation
National Lock Washer Company
Nichols Engineering Company
Nordberg Manufacturing Company
Northwestern Motor Company
Oxweld Railroad Service Company
The P. & M. Company
Pettibone Mulliken Company
Philadelphia Steel & Wire Corp.
Pocket List of Railroad Officials
Power Ballaster Company

(*Continued on page* 170)



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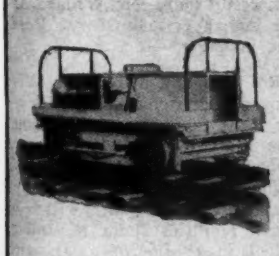
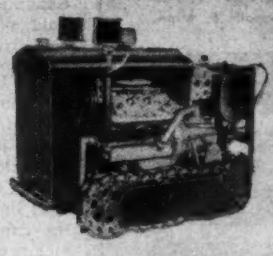
BALANCE— Two compressor, two motor cylinders on each side of the Ford-Mercury V-8 block.

EASE OF MAINTENANCE— Ninety per cent of the Fordair's parts are quickly available from your local Ford-Mercury dealer.

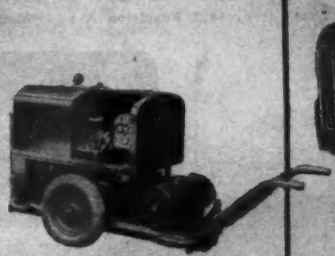
SCHRAMM INC. THE COMPRESSOR PEOPLE WEST CHESTER PENNSYLVANIA



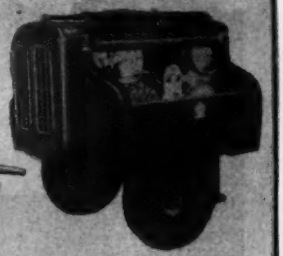
Fordair Model 60 Railcar



Fordair Model 60 Crawler



Fordair Model 60 Tampair



Fordair Model 60 Standard Two-wheel Trailer

(*Continued from page* 168)

Racine Tool & Machine Co.
The Rail Joint Company
Railroad Products Company
The Rails Company
Railway Engineering and Maintenance
Railway Maintenance Corporation
Railway Purchases & Stores
Railway Track-Work Company
Ramapo Ajax division, American Brake Shoe Company
Reade Manufacturing Company
Republic Steel Company
The Ric-Wil Company
Rust-Oleum Corporation
Schramm, Inc.
R. H. Sheppard Company
Silent Hoist Winch & Crane Co.
T. W. Snow Construction Company
Sperry Products, Inc.
Taylor-Colquitt Company
Teleweld, Inc.
Templeton, Kenly & Co.
Thornley Railway Machine Company
Timber Engineering Company
Unit Crane & Shovel Corp.
Warner & Swasey Company, Gradall division
Winpower Manufacturing Company
Woodings-Verona Tool Works
Woolery Machine Company
Worthington Pump & Machinery Corp.

Supply Trade News

General

The **Drott Manufacturing Corporation** has announced the completion of new office and manufacturing buildings at 4344 North Green Bay ave., Milwaukee 12, Wis.

The **Graver Tank & Mfg. Co.,** East Chicago, Ind., has purchased the **Banks Moreland Company** of Houston, Tex., which will be operated under that name as a division of Graver Tank. **Banks Moreland** has been appointed a vice-president of Graver Tank.

The **Formica Insulation Company,** Cincinnati, Ohio, has opened a factory sales office at 3606 Commerce street, Dallas, Tex., under the management of **Morton F. Harvey,** formerly of the sales office in Chicago.

R. G. LeTourneau, Inc., Peoria, Ill., has announced the establishment of a full export division vested with corporate authority to perform all export functions. The new division, shortly to be transferred to New York City, will be under the direction of the following executive personnel: **Paul E. Fulford,** manager; **Paul M. King,** assistant manager in charge of sales; **L. L. Petefish** and **R. P. Nichols,** assistant sales managers; **E. P. Sandmeyer,** credit manager; **Willard Arnold,** office manager; and **George Rosewell,** traffic manager.

The **Le Roi Company,** Milwaukee, Wis., has announced the purchase of the Cleveland Rock Drill Company of Cleveland, Ohio. **Russ Morgan,** formerly secretary and sales manager of the Cleveland Rock Drill Company, a division of the Cleveland Pneumatic Tool Company, will head the expanded facilities. **John M. Dolan,** vice-president in charge of sales, with headquarters at Milwaukee, will head the integration of sales of all Le Roi products. Expanded field activities will utilize the

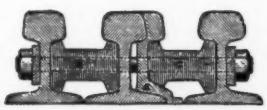
(*Continued on page* 172)

FRED. C. WEIR'S

Improved Steel Rail Frogs.

Spring Rail Frog.

Section of same.



Section of same.

Stationary Rail Frog.

The above cuts represent plans and cross sections of my improved steel rail frogs, and for the better understanding of them, attention is called to the following description, reference being made to the letters on the cuts themselves:

A shows my method of joining the short point rail to the main point rail, by which I avoid entirely the cutting of the latter, thus preserving its full strength and ***which is not done by manufacturers who notch the short point rail into the main point by cutting away either the head or flange or both as it is the common custom.***

B shows the construction of the spring or movable wing rail of my spring rail frog, by which plan of setting the inside flange of the wing rail up, and on top of the flange of the main point rail ***I avoid entirely the cutting away of the inside flange as has always heretofore been the practice, thereby saving the full strength of the rail*** as well as ensuring the point and wing rail being on an even surface when the wheels are passing over them.

C, strap for holding down spring rail and thereby taking the undue strain off from the spring bolt.

D, strap and sliding plate combined.

E, spring.

F, flexible joint by the use of which ***I am enabled to make spring rail frogs of the same length as the ordinary fixed rail frogs, thus saving a large amount of usually wasted material and which is not practicable without the use of this joint.***

G, showing one plan of construction with cast iron spacing blocks.

H, showing my manner of construction with U shaped or channel iron spacing pieces. ***The exclusive right to manufacture frogs constructed in this manner, is secured to me broadly by letters patent of the United States.***

I claim for the above improvements, the following advantages:

The strongest and most durable construction of main and short points and ***which is the vital part of any frog.***

The only spring frog constructed by which the full strength of the spring rail is preserved.

The only spring frog constructed that can be used of the same length and to be put in place of the ordinary fixed or stationary rail frogs for Standard and Narrow Gauge Railroads.

Prices furnished on application. Address,

FRED. C. WEIR,

December 1879 GRAND HOTEL, CINCINNATI, OHIO.

From this modest beginning, over 65 years ago, this company has developed into one of the major producers of special track work for the nation's leading railroads.

WEIR KILBY CORPORATION

CINCINNATI 12, OHIO — Successors to — BIRMINGHAM 7, ALA.

WEIR FROG CO. . . . KILBY FROG & SWITCH CO. . . . CINCINNATI FROG & SWITCH CO.

(*Continued from page* 170)

company's district offices. Overseas sales will be handled by the foreign sales department at Milwaukee. The manufacture of Le Roi-Cleveland products is being transferred to Le Roi's new plant at Cleveland.

Personal

Jack W. Cannon has been appointed railroad sales representative in the Chicago area for **W. F. Hebard & Company,** 336 West 37th Street, Chicago 9.

A. A. Bareuther has been appointed manager of the rail and fastenings department of **Robert W. Hunt Company,** Chicago. He was formerly manager of the company's office at St. Louis, Mo.

D. A. Mitchell has been appointed general superintendent of plants and operations of the wood preserving division of the **Koppers Company, Inc.,** Pittsburgh, Pa., and **E. R. Snodgrass** has been appointed chief engineer.

Robert C. Judd has been appointed market research manager of **R. G. LeTourneau Inc.,** Peoria, Ill., replacing **Wendell Richards,** who resumes his duties as district sales representative.

Anthony C. Fecht has been appointed manager of railway sales of the **Lewis**

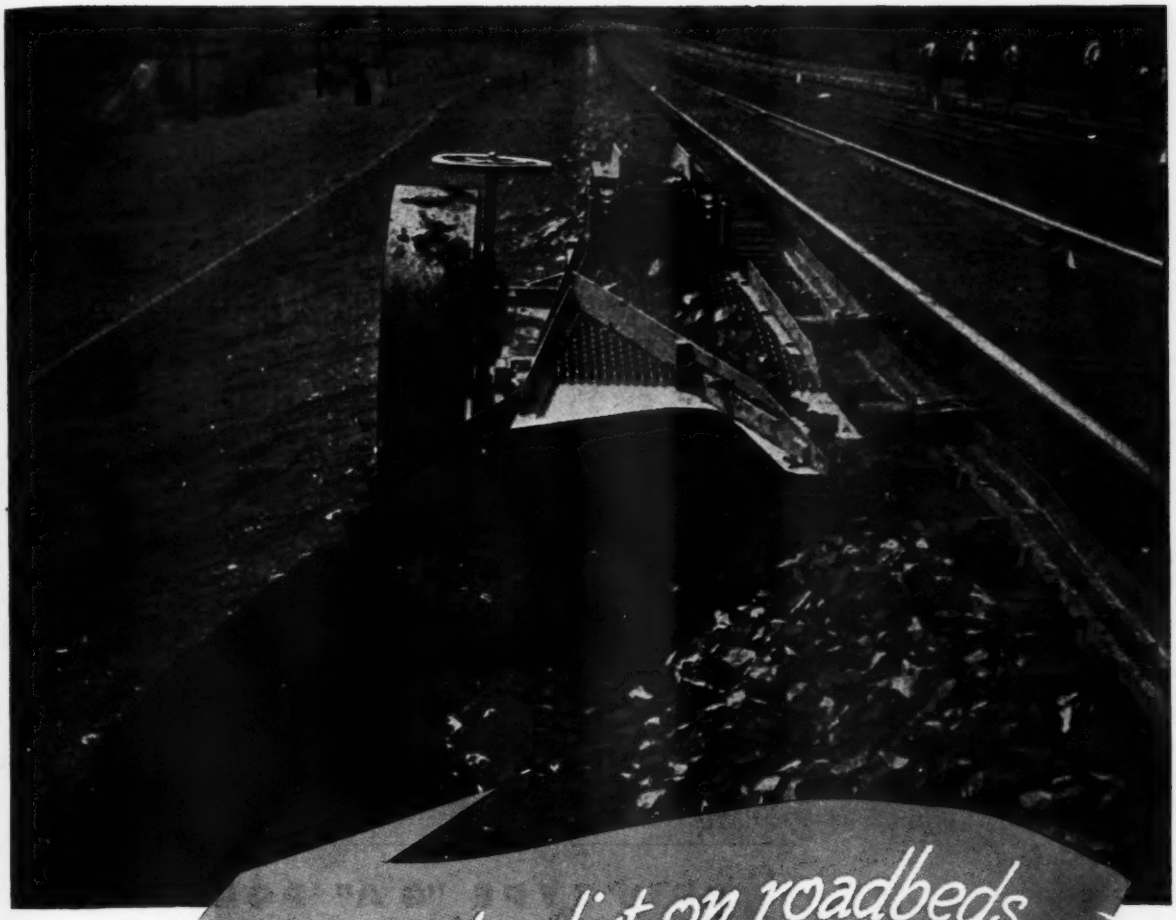
Anthony C. Fecht

Bolt & Nut Co., Minneapolis, Minn. Mr. Fecht has been associated with the company since 1928.

F. R. McMillan, director of research of the **Portland Cement Association,** Chicago, has been appointed assistant to the vice-president for research and development. **H. F. Gonnerman,** manager of the association's research laboratory, becomes director of research. **William Lerch,** senior research chemist in the Chicago laboratory, has been appointed manager in charge of the department of applied research.

Ray L. Rex has been appointed general superintendent of railroad service for the **Air Reduction Sales Company,** with headquarters in New York, and will report to G. V. Slottman, manager of the technical sales division. Mr. Rex entered railroad service in 1919 with the Lehigh

(*Continued on page* 174)



Here's the dirt on roadbeds...

and it's not good unless you get it out. The McWilliams "Mole" will clean your roadbeds for you quickly and efficiently. A crew of only four men can clean 850 to 1200 feet of shoulder in 8 hours with the shoulder model illustrated. Five men can do a similar job with the intertrack model.

RAILWAY MAINTENANCE CORP.

PITTSBURGH 30, PENNSYLVANIA

(*Continued from page* 172)

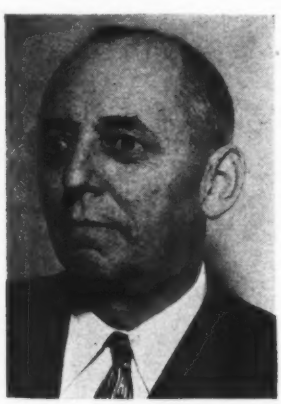
Valley, and from 1928 to 1940 he served as engineer-in-charge of the Perth Amboy (N.J.) Terminal. In 1942 he joined the New York, Ontario & Western as mechanical assistant to the superintendent of motive power.

Samuel L. H. Burk has been appointed director of industrial relations for the **Pittsburgh Plate Glass Company,** to succeed **Erson V. Ogg,** who has resigned. Mr. Burk was formerly director of organizations and methods for the Atlantic Refining Company.

H. C. Crawford, former general traffic manager of the **Bethlehem Steel Company,** has been elected vice-president in charge of traffic, to succeed **J. M. Gross,** who has retired after 30 years' service. **F. M. Huffman,** traffic manager, has been appointed general traffic manager, to replace Mr. Crawford.

John S. King, assistant manager of the railroad division, **Fairbanks, Morse & Co.,** with headquarters at Chicago, has been appointed manager of the firm's Chicago branch. He succeeds **Frank V. Roy,** who will retire on March 1.

Dr. C. Earl Webb, whose appointment as chief engineer of the **American Bridge Company** (a subsidiary of the United States Steel Corporation), with headquarters at Pittsburgh, Pa., was reported in the January issue, is a graduate of Michigan State College, which in 1940 conferred upon him the honorary degree of doctor of engineering. He entered the service of the American Bridge Company in 1914, as a draftsman in the plant at Gary, Ind. In 1922 he became designing engineer in the company's Chicago office, and served in that position until 1935, when he was appointed western division engineer.



Dr. C. Earl Webb

Hayes Parsons, formerly general sales manager of the **Link-Belt Speeder Corporation,** 307 N. Michigan avenue, Chicago 1, has been appointed assistant to the president, with headquarters at Cedar Rapids, Iowa. He will have charge of the domestic sales of Link-Belt Speeder shovel-cranes.

Frederick J. Lindauer, whose appointment as manager of **Fairbanks, Morse & Co.'s** Washington, D. C., office was reported in the January issue, joined Fairbanks, Morse in 1923 at the Three Rivers, Mich., plant. In 1925 he was appointed sales and application engineer, with headquarters at Baltimore, Md., and from 1926 to 1931 served as inspection engineer under the director of engineering for the company's factories in Beloit, Wis., Three Rivers and Indianapolis, Ind. He later spent several years in the Chicago office and in 1933 was appointed sales engineer for the New York branch, serving in that capacity until his transfer to the Washington office in 1935.

Frederick J. Lindauer

D. M. Booth has been appointed regional manager, export division, of the **Nordberg Manufacturing Co.,** Milwaukee, Wis., with headquarters at Mexico City, Mexico. A graduate of the University of Alabama and Cornell University, Mr. Booth has been chief engineer and superintendent of power in both Diesel and steam plants in the United States and in Mexico. During the war he served as mechanical engineer in connection with the work of the United States Railway Mission in Mexico. He was formerly in charge of Mexican operations for the Worthington Pump and Machinery Corporation in Mexico.

Obituary

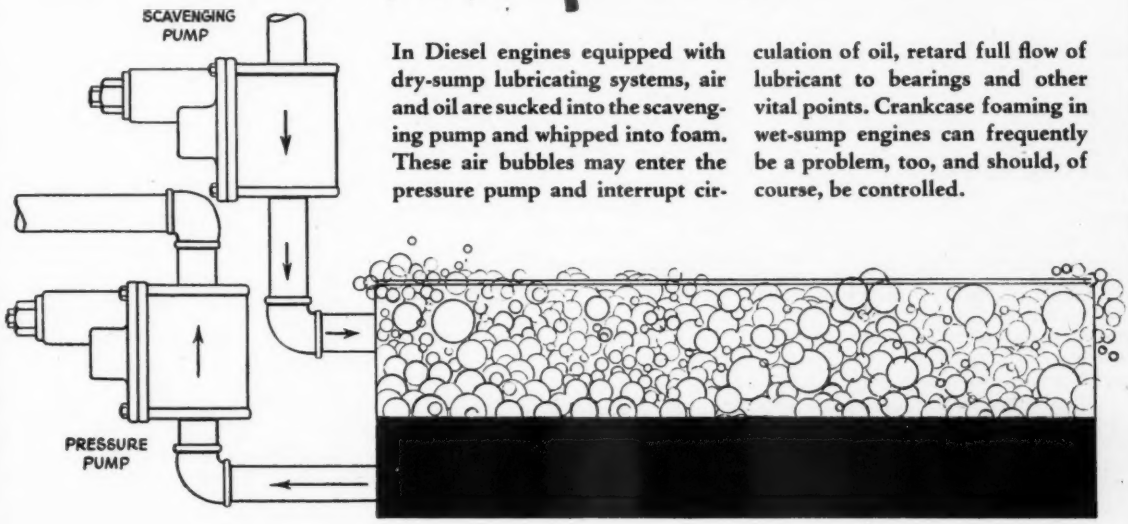
W. P. Hunt, Jr., former vice-president of the Buda Company, died at his home in Chicago on December 30.

Robert H. Moore, retired general manager of the American Creosoting Company, at Louisville, Ky., died in that city on January 6, at the age of 75. Mr. Moore was born in Chicago, and received his higher education at Lebanon College in Ohio and at Valparaiso University in Indiana. He began his career with the engineering forces of the Pennsylvania, at Cincinnati, and in 1902 he became assistant engineer on the Cleveland, Cincinnati, Chicago & St. Louis, also at Cincinnati. From 1903 to 1905 he served as division engineer of the Cairo division, and from 1906 to 1908, as assistant engineer. In 1908 he was appointed engineer of construction and superintendent of the American Creosoting Company, and in

(*Continued on page* 176)

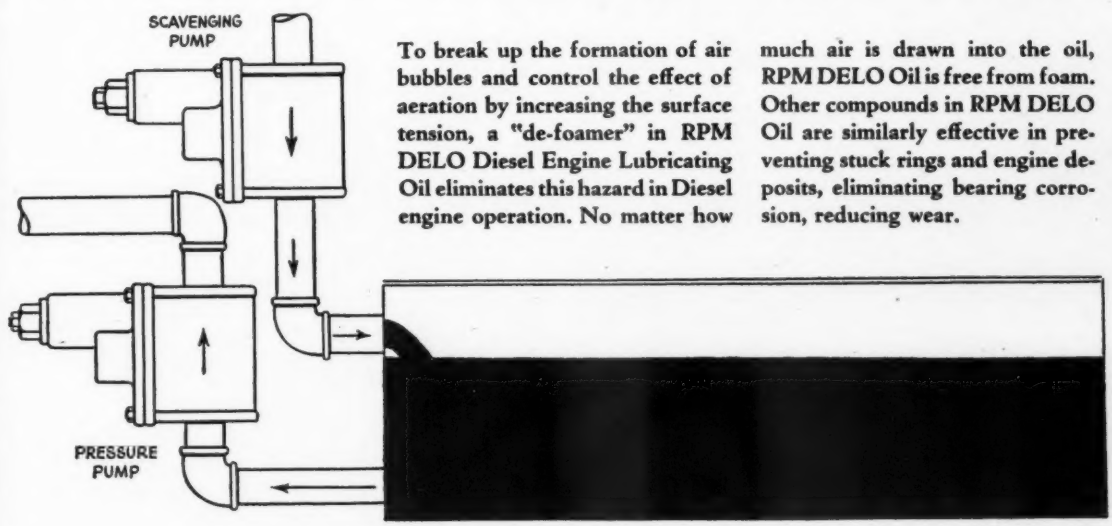
Diesel Engine DANGER points

AIR BUBBLES ENDANGER OIL CIRCULATION



In Diesel engines equipped with dry-sump lubricating systems, air and oil are sucked into the scavenging pump and whipped into foam. These air bubbles may enter the pressure pump and interrupt circulation of oil, retard full flow of lubricant to bearings and other vital points. Crankcase foaming in wet-sump engines can frequently be a problem, too, and should, of course, be controlled.

RPM DELO OIL PREVENTS CRANKCASE FOAMING



To break up the formation of air bubbles and control the effect of aeration by increasing the surface tension, a "de-foamer" in RPM DELO Diesel Engine Lubricating Oil eliminates this hazard in Diesel engine operation. No matter how much air is drawn into the oil, RPM DELO Oil is free from foam. Other compounds in RPM DELO Oil are similarly effective in preventing stuck rings and engine deposits, eliminating bearing corrosion, reducing wear.

To match the fine performance of RPM DELO OIL, use these equally efficient companion products from the same famous "RPM" line—RPM HEAVY DUTY MOTOR OIL —RPM COMPOUNDED MOTOR OIL—RPM GEAR OILS AND LUBRICANTS—RPM GREASES. For additional information or name of your distributor, write any of the companies below:

STANDARD OF CALIFORNIA • 225 Bush St., San Francisco 20, California
THE CALIFORNIA COMPANY • 17th and Stout Streets, Denver 1, Colorado
STANDARD OIL COMPANY OF TEXAS • El Paso, Texas
THE CALIFORNIA OIL COMPANY • 30 Rockefeller Plaza, New York 20

DIESEL ENGINE RPM DELO LUBRICATING OIL

(*Continued from page* 174)

1910 he was advanced to assistant general superintendent and chief engineer. From 1920 to 1926 he served as general manager of the Canada Creosoting Company; and in the latter year he returned to the American Creosoting Company as general manager, the position he held at the time of his retirement.

Trade Publications

(*To obtain copies of any of the publications mentioned in these columns use postcards, page* 125.)

Earth Moving Units—R. G. LeTourneau, Inc., Peoria, Ill., has published a new 12-page folder, Form No. T.P.-126, dealing with the company's Tournapull scraper-hauling units. This booklet contains an ample number of action photographs showing Tournapulls at work on a wide range of earth-moving jobs.

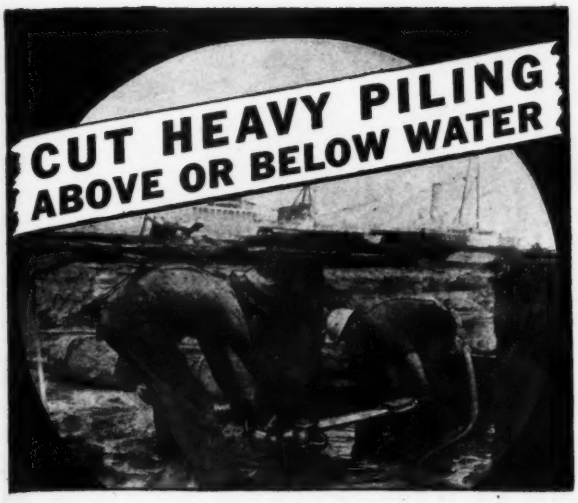
Fire Extinguisher Data Guide—Important information concerning the performance, maintenance and suitability of various types and sizes of fire extinguishers may be determined rapidly with the aid of a convenient, pocket-size data guide prepared by Randolph Laboratories, Inc., 80 E. Kinsey street, Chicago 11. The data guide embodies a cardboard envelope containing a sliding selector card, with pertinent information regarding the various types of extinguishers. An opening in the envelope aids in the rapid location of the desired information. The guide includes facts concerning soda-acid, pump-tank, loaded-stream, dry-powder, carbon-tetrachloride and carbon-dioxide extinguishers. On the reverse side of the selector card additional tabular information is given regarding plant fire hazards, the bracketing of extinguisher units, their location with respect to the operators and the areas protected by each type.

Welding Service Catalog—Teleweld, Inc., Chicago, has published a 26-page illustrated catalog, entitled Maintenance Service for Railroads, which describes proper welding procedure in rebuilding rail ends, rail-end hardening, frog and switch reclamation, steel bridge reinforcing and repairing, and this company's method of moving steel, water, oil, and gasoline storage tanks from existing sites to new locations. Included also are descriptions of the company's improved joint-bar shims, hardness testing instrument, and rail-flaw detector car.

Rust-Oleum Stops and Prevents Rust—This is a 34-page catalog published by the Rust-Oleum Corporation, Evanston, Ill., in which the specifications, applications, and directions for use of the rust-preventative materials manufactured by that company are listed. In addition the catalog includes a color chart showing the finish of each of the rust-preventative paints, and also contains a color chart of machinery and implement finishes.

Caterpillar Scrapers—Specifications and production features of the new Caterpillar scrapers are described in an illustrated broadside, Form 9372, issued by the Caterpillar Tractor Company, Peoria, Ill. The scrapers are matched in capacity to the power of the company's Diesel-powered tractors and built to perform in combination with them as complete earth-moving units.

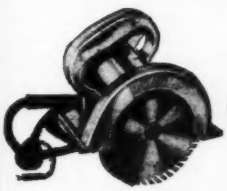
Sperry Rail Service Review—This is the current issue of the house organ published by the Sperry Rail Service, Hoboken, N.J. It contains 12 pages and is devoted largely to a number of interesting articles on the testing of rails and on rail defects. Chief among these is a discussion of the new method of classifying rail defects as adopted by Sperry Rail Service on January 1, 1947. Other subjects include a study of service failures caused by detail fractures from shelling, and a discussion of service failures in control-cooled rail.



with Mall PNEUMATIC CHAIN SAW

IMMEDIATE DELIVERY

Specifications for speedy dock and bridge construction — harbor improvements — crossings — and large engineering jobs call for the Mall Pneumatic Chain Saw. This versatile heavy duty power tool goes through a 12 x 12 in 10 seconds . . . it cuts piling within 2 inches of the ground . . . it can be used under water. Its 360 degree index allows horizontal, vertical or any angle cuts . . . its rotary type motor has an automatic oiler to simplify maintenance . . . the exhaust keeps the cutting chain free from dirt. Immediately available in 24, 36 and 48 inch cutting capacities.



MODEL 60 MallSaw

Model 60 MallSaw rips and cross-cuts any kind of rough or dressed lumber up to 2 inches. When equipped with a Mall longwearing abrasive disc, it can be used for cutting and scoring tile, limestone, concrete and other aggregate compositions. The lightweight, rust proof aluminum alloy housing, comfortable handle with trigger switch, and perfect balance make for easy handling. Available in 110-volt AC-DC or 220-volt AC-DC.

Complete Catalog Upon Request

Railroad Department

MALL TOOL COMPANY

7746 South Chicago Ave. Chicago 19, Illinois

MALL REPRESENTATIVES: D. L. O'Brien, St. Paul; Earl E. Thulin Co., Chicago; Allied Tools & Supply Co., Louisville; G. A. Secar, St. Louis; John N. Thorp Co., New York.

25 Years of "Better Tools For Better Work"

Mall PORTABLE POWER TOOLS

"Patrol" Compressor, made by Chicago Pneumatic Tool Company powered by VP4 Air-Cooled Engine.

They're "On The Job"

WHEN YOU SPECIFY —

WISCONSIN

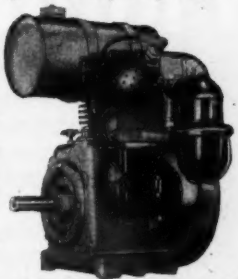
Heavy-Duty Air-Cooled ENGINES

Both machine-power and man-power are "on the job" all day long, every day . . . when tools and equipment are powered by Wisconsin Heavy-Duty Air-Cooled Engines.

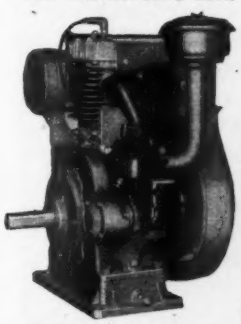
More and more, Wisconsin Engines are being used to supply power for tampers, tie cutters, rail and frog grinders, air compressors for pneumatic tools and many other machines that require heavy-duty, dependable power units.

Compact in design, Wisconsin Engines range in size from 2 to 30 hp. and assure trouble-free cooling in any weather.

Be sure to specify "Wisconsin Air-Cooled Engine" when ordering motorized equipment for railway maintenance . . . for "on the job" efficiency at low maintenance cost.



2 to 4 hp.: Models AB and AK, 4 cycle, single cylinder engines.

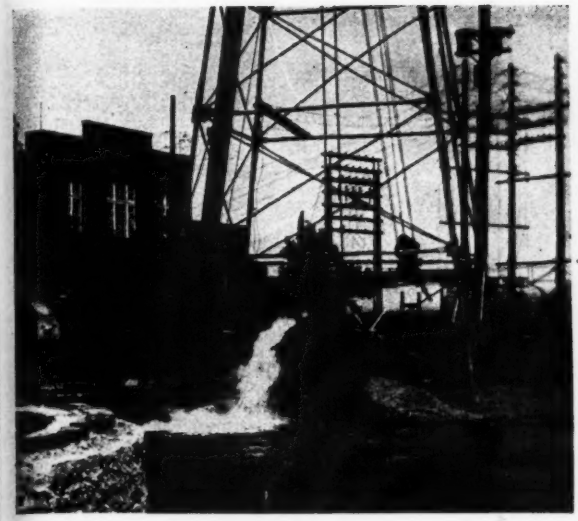


3 to 9 hp.: Models AEH, AFH, AGH, and AHH, 4 cycle, single cylinder engines.

15 to 30 hp.: Models VE4, VF4, and VP4, 4 cycle, four cylinder V-type engines.

Most H.P. per pound WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

For additional information, use postcard, pages 125-126



WATER MEANS A LOT
TO CITIES LIKE SIOUX FALLS, S. D.

Sioux Falls, S. D., is a typical American City. like many other smaller towns, it is growing into a much more important distribution and manufacturing point. Water for further growth was needed in large—but economical quantities. The choice was a Layne Well Water System that is now producing a million gallons daily.

Sioux Falls is not burdened by high operation cost, and furthermore there will be very little—or perhaps no repair expense for years to come.

Layne Well Water Systems, used and famous the world over, are engineered for heavier duty than ever called upon to perform. Such extra ruggedness and remarkably fine quality makes them an unmatched investment for any city or industry. These Well Water Systems are built in a wide range of capacities suitable for present needs and future growth. Space requirements are small and installations can be completed in a matter of weeks.

For further information, literature, etc., address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

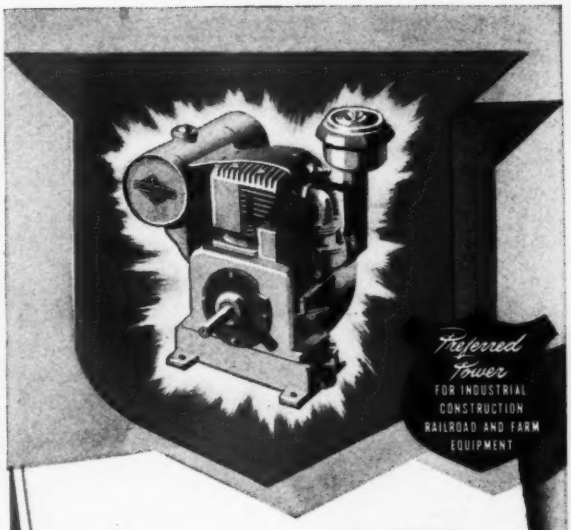
HIGHEST EFFICIENCY

Layne Vertical Turbine Pumps are available in sizes to produce from 40 to 16,000 gallons of water per minute. High efficiency saves on power cost.

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Pacific, Inc., Seattle, Wash. * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Western Co. of Minnesota, Minneapolis, Minn. * International Water Supply Ltd., London, Ontario, Canada * Layne-Hispano Americana, S. A., Mexico, D. F.

LAYNE

WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS



BRIGGS & STRATTON
ENGINES

The 3-Way Power Choice

1. **MANUFACTURERS** select compact, precision built Briggs & Stratton engines because experience proves they provide the RIGHT power to operate their equipment at maximum efficiency.
2. **DEALERS** choose to sell equipment powered by rugged, instant-starting Briggs & Stratton engines, because it pays to sell equipment that's powered RIGHT for long life — and requiring minimum servicing.
3. **USERS** insist on equipment powered by Briggs & Stratton air-cooled engines, because of their world-wide record for dependable operation.

More than 2¾ million Briggs & Stratton engines built during the past 26 years furnish conclusive proof that "It's powered RIGHT when powered by Briggs & Stratton".

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wisconsin, U. S. A.

4 CYCLE BRIGGS & STRATTON GASOLINE ENGINES

Air-Cooled Power

Classified Advertisements

Use this section when seeking a new man, new position, or when buying or selling secondhand equipment.

CLASSIFIED ADVERTISEMENTS, $10.00 an inch, one inch deep by three inches wide, an insertion.

EMPLOYMENT ADVERTISEMENTS, 10 cents a word a month, including address, minimum charge $2.00.

Remittance must accompany each order.

Railway Engineering and Maintenance
Classified Advertising Department
105 West Adams St., Chicago 3

Well established Railway Supply Company wishes to acquire a railway device in mechanical or track maintenance fields by outright purchase or on royalty basis. Address Box 247.

ALPHABETICAL INDEX TO ADVERTISERS, FEBRUARY, 1947

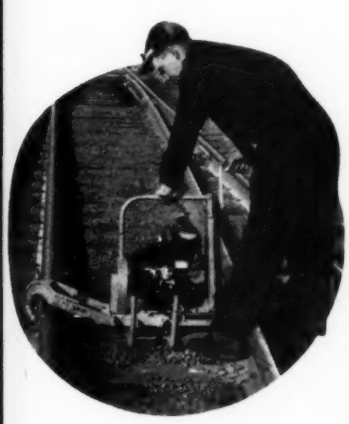
BUDA POWER Track D

. . . ALL THE FEATURES RAILROAD MEN WANT

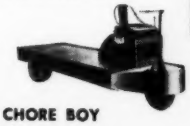
Easy to Use . . .

- **FAST**— *Drills holes in 30 seconds!*
- **COMPACT and LIGHT**— *Weighs only 130 lbs.*
- **ONE MAN OPERATION**— *Easily set up.*
- **SAFE and ACCURATE**— *Fast, precision adjustment.*
- **PROVED IN SERVICE**— *One railroad saved over $600.00 in one month's operation.*

• *WRITE FOR NEW BULLETIN 1233* •



Drills Between Narrow Rail Sections near Switches



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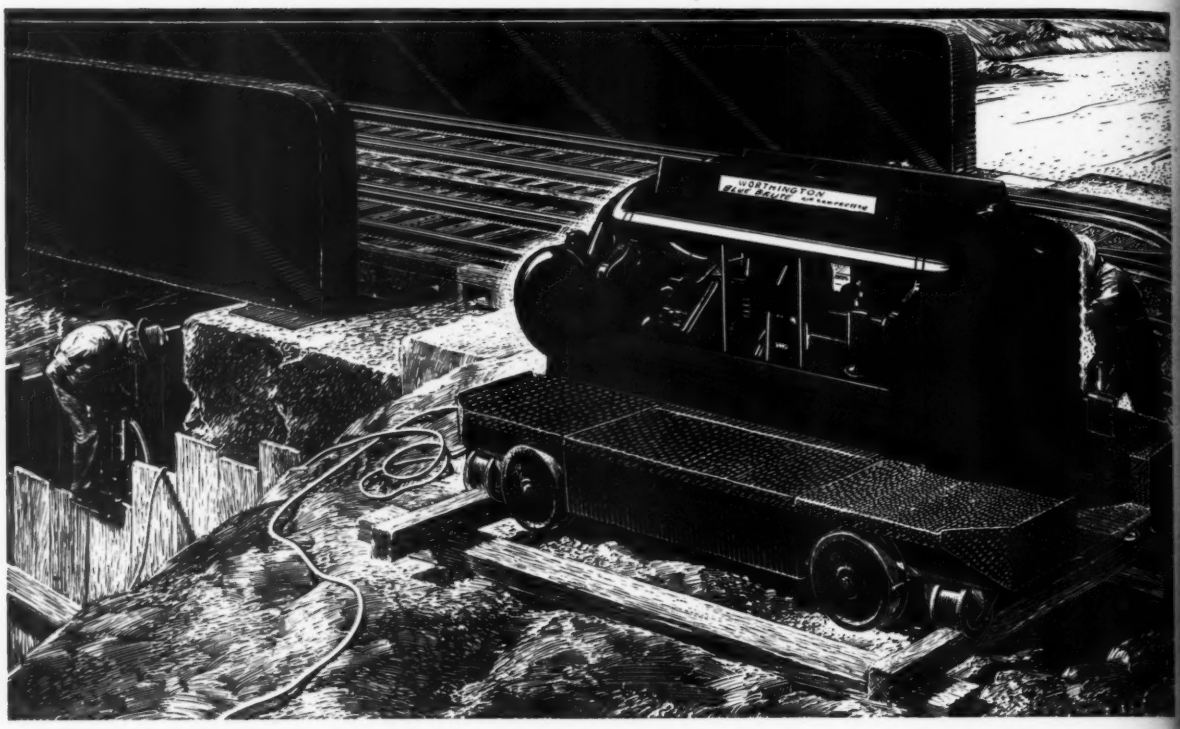
BUDA JACKS

RIGHT... ON THE RIGHT OF WAY



Emergencies are short-lived when you tackle them with Blue Brutes. For example, at driving sheeting clean and fast around flood-weakened supports, nothing can beat these two star performers on the Worthington Track Team.

The Blue Brute Rail Car Compressor moves up on the rails and then easily off to one side, on a simple rig of skids and transverse wheels. Then you've got an unfailing source of power for as long as you want it . . . thanks to Worthington's easy-breathing Feather* Valves, three-point suspension of engine and compressor in a single housing, and full force-feed lubrication.

Hooked up to Blue Brute WSD-81 Sheeting Drivers, this two-fisted air-supply delivers fast, hard blows that get your sheeting down in record time, under all conditions.

There are Blue Brutes for greater speed and economy on every type of job. Rock Drills and Air Tools, portable gasoline or Diesel Compressors . . . champions all, at making less air do more work . . . each one ready to prove to you that *there's more worth in Worthington.*

Get more WORTH *from air with* WORTHINGTON

BUY BLUE BRUTES

*Reg. U. S. Pat. Off.

HB-19

Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

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